Market Efficiency Challenges and Opportunities in SPP

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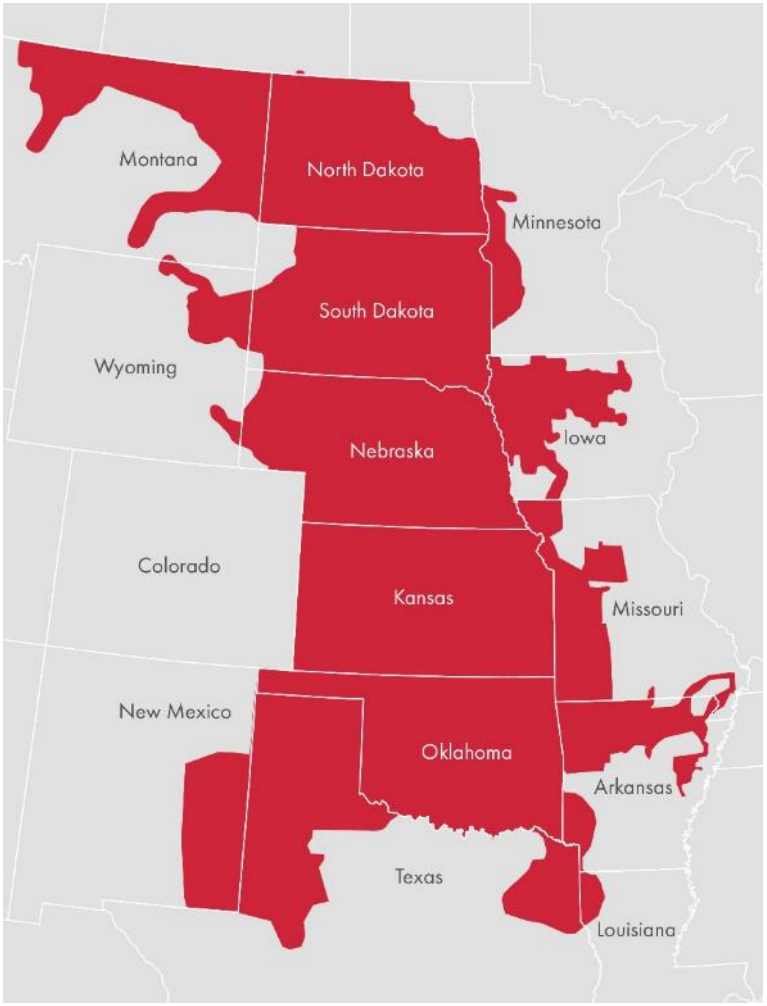
SPP
75th Anniversary
75
SEVENTY-FIVE YEARS OF
RELIABILITY THROUGH RELATIONSHIPS

The SPP Footprint: Members in 14 States



- **Arkansas**
- **Kansas**
- **Iowa**
- **Louisiana**
- **Minnesota**
- **Missouri**
- **Montana**
- **Nebraska**
- **New Mexico**
- **North Dakota**
- **Oklahoma**
- **South Dakota**
- **Texas**
- **Wyoming**

Challenges

1. Constraint management
   - SPP's market system controls only real power (MW) flows
   - Transmission System limitations are based on static information
2. Computer processing power constrains ability to enhance the market
3. Concerns about price formation in real-time and through reliability commitments
4. Appropriate balance between reliability and market efficiency
   - Identifying and reducing market surplus
   - Recognizing voltage and other constraints in market design

Constraint management

- SPP's systems analyze multiple contingencies (N-2) in defined situations
  - Double circuit facilities and certain ring-bus configurations
- Transmission system limits continuously evaluated
  - Determine appropriate facility rating given current and expected ambient conditions
- SPP uses MW limits as proxies for voltage constraints
  - Examples: Texas Panhandle (SPPSPSTIES) and Oklahoma/Louisiana (PSOSWEPCO)
- Possibility of incorporating some AC analysis looks promising

Computer Processing Power

- Processing power is a constraint in implementing market efficiency
  - Number of constraints, market products, features drive solution time
  - SPP's system solves for multiple products
    - Energy, Reg Up, Reg Down, Spin and Supp
  - Real-time market power mitigation
- Single-threaded versus multi-threaded optimization
- Challenges in progress
  - Multi-stage units ("enhanced combined cycle optimization")
    - Requires more processing power
  - Alignment with the Gas Day
    - Requires faster solution times
    - Incremental approach

Anticipated processing efficiency improvements

- Upgrading to new version of linear optimization platform
  - 21 percent average unit commitment algorithm reduction
- Upgrading clearing engine server (single-threaded focus)
  - 10-15 percent increase in solution time efficiency
- Decreased granularity for portion of studies
  - 4-hour-at-a-time look-ahead versus 1-hour-at-a-time
- Running more
  - Staggered start study intervals
    - Launch subsequent hours of economic dispatch before completing a given hour
  - 10-15 percent increase in solution time efficiency
- Database and architectural efficiencies

Price formation issues

- Issues under consideration by stakeholders
- Ramp optimization
  - Optimizing for resource ramp across multiple intervals in real time
    - Real-time ramp product
  - Rampable capacity in RUC
  - Rampable capacity is not cleared in Day Ahead Market
- Use of scarcity pricing
  - Sharing of ramp with other products
  - Analyzing required changes for FERC order
- Block loading of quick start resources reflected in LMPs

Reliability and Market Efficiency

- Reduction in required regulation reserves by 20 percent
  - Based on analysis of historical performance and experience
- Certain reliability issues are not detected by market system
  - Voltage contingencies, transient stability concerns
  - Offline analysis occurs periodically
  - Real-time systems model conditions
  - Modeled in market system using MW limits as a proxy

Market System "Near AC" Analysis

- SPP is experimenting with research by Case Western University
- "Near AC analysis" or "Generalized DC solution"
  - Objective: Determine feasible approach for analyzing voltage security
  - Continue to use a linear power flow model
  - Ensure reasonable solution times
- Will validate solution against observation and offline analysis tools
- Discussion of how to incorporate into market design
  - Pricing and settlements impacts

Questions ?

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