



SIR11 VOLTAGE SECURITY CONSTRAINTS IN SPP MARKETS

USING GENERALIZED DC POWER FLOW

MARKET DESIGN

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*Helping our members work together to keep
the lights on... today and in the future.*



SouthwestPowerPool



SPPorg



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WHAT WILL YOUR INITIATIVE DO FOR SPP'S MARKET

- Allow SPP to model both bus voltage constraints and the impacts of reactive power on flowgate constraints
- Allows SPP to do so without having to move to a full AC based market
 - AC based SCUC/SCED would have lots of impacts to software, systems, performance, robustness, and pricing

HOW IS SPP'S MARKET IMPROVED BY IMPLEMENTING YOUR INITIATIVE

- SPP (and all other North American RTO/ISOs) use a real power (MW-only) market that does not see the impact of reactive power (MVARs)
- This enhancement would allow SPP to automatically manage bus-voltage deviations and do so with transparent prices
- Reactive power impacts on transmission constraints would be factored into the market

POTENTIAL SYSTEM IMPACTS

- MKTNET (network calculation engine for sensitivities like GSFs)
- MCE
- Settlements
- Market Protocols and Tariff
- MUI
- Potentially AGC and SCADA

POTENTIAL MCE PERFORMANCE IMPACT

- Additional bus voltage constraints would have some non-zero impact on performance
- Adding reactive power impacts on transmission constraints would also introduce impacts due to reading the additional data

POTENTIAL COMPLEXITY

- Two methods exist for implementing this logic
 - Active Power Only – relatively minor changes
 - Active and Reactive Power – large changes required
- **Active and Reactive Power method**
 - This method allows SPP to dispatch reactive power in addition to the real power it dispatches today
 - This would require sending voltage setpoints to resources (big change)
 - Also involves adding a second LMP price

POTENTIAL RISKS

- Additional sensitivities would need to be calculated by MKTNET which has performance impacts for both MKTNET and later for MCE
- Precise voltage sensitivities require additional modeling accuracies that are not required today
 - Voltage sensitivity calculation method would need to be investigated in greater detail to ensure it works under a variety of circumstances
- Voltage support is inherently local and could lead to concerns of market power (more discussion required)
- Reactive power dispatch would be a large change with unforeseen consequences for SPP and Membership

MARKET PHILOSOPHY IMPACTS:

- Bundling voltage support services into the market instead of the currently out-of-market compensation method allows for a more economic and price transparent solution

EXAMPLE/RESEARCH/ANALYSIS INFORMATION

- <https://www.ferc.gov/CalendarFiles/20180627103134-T3-1-Schoppe.pdf>