



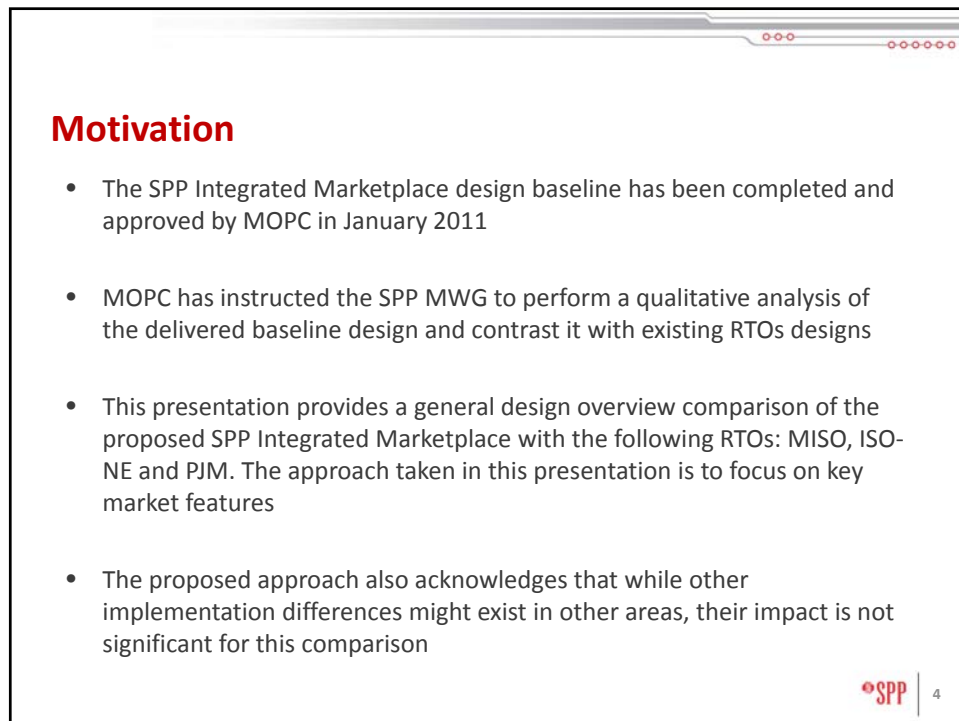
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Market Working Group

February 2, 2011


Market Design Overview Comparison

 **SPP** Southwest Power Pool

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Motivation

- The SPP Integrated Marketplace design baseline has been completed and approved by MOPC in January 2011
- MOPC has instructed the SPP MWG to perform a qualitative analysis of the delivered baseline design and contrast it with existing RTOs designs
- This presentation provides a general design overview comparison of the proposed SPP Integrated Marketplace with the following RTOs: MISO, ISO-NE and PJM. The approach taken in this presentation is to focus on key market features
- The proposed approach also acknowledges that while other implementation differences might exist in other areas, their impact is not significant for this comparison

 4

Agenda

- Market Overview Matrix
- Feature Overview
 - Day-Ahead Market
 - Real-Time Market
 - Must-Offer in Day-Ahead Market
 - Resource Make-Whole Payment
 - Real-Time Market Settlement
 - Operating Reserve – Reserve Zones
 - Operating Reserve – External Reserve Transfer
 - Marginal Losses
 - Co-optimization
 - Combined Cycle Special Handling
 - TCRs / ARRr

Agenda

- Feature Overview (Continued)
 - Jointly Owned Resources
 - Virtual Transactions
 - Forward Capacity Market
- Conclusion

Market Feature Overview Matrix

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Day-Ahead Market	✓*	✓*	✓	✓
Real-Time Market	✓	✓	✓	✓
Must-Offer in Day-Ahead Market	✓*	✓*	✓*	✓
Resource Make-Whole Payment	✓	✓	✓*	✓
Real-Time Market Settlement	✓*	✓*	✓*	✓
Operating Reserve - Reserve Zones	✓*	✓*	✓*	✓
Operating Reserve – External Reserve Transfer	-	-	-	✓
Marginal Losses	✓*	✓*	✓	✓
Co-optimization	✓*	✓*	✓	✓

✓ : exists
 ✓*: exists, some difference with SPP Integrated Marketplace
 - : does not exist



Market Feature Overview Matrix

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Combined Cycle Special Handling	✓*	✓*	✓*	✓
Transmission Congestion Rights/Auction Revenue Rights (TCRs/ARRs)	✓	✓	✓	✓
Jointly Owned Resources	✓*	✓*	✓*	✓
Virtual Transactions	✓	✓	✓	✓
Forward Capacity Market	✓	✓	-	-

✓ : exists
 ✓*: exists, some difference with SPP Integrated Marketplace
 - : does not exist



Feature Overview: Day-Ahead Market

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Day-Ahead Market	✓*	✓*	✓	✓

- The Day-Ahead Market feature exists in all 4 RTOs and has the following:
 - Financially binding
 - Market clearing is based on Offers and Bids and External Purchases/Sales
 - Resources cleared in the Day-Ahead Market are expected to be physically available for Real-Time Market
 - Market clearing is using Security Constrained Unit Commitment (SCUC), coupled with a Security Constrained Economic Dispatch (SCED)

Feature Overview: Day-Ahead Market

- Differences in Offers/Bids specification scope:
 - **PJM, ISO-NE:** Resources provide a singular daily Offer, which cannot be modified in Real-Time if awarded. Resources also need to submit cost-based offer information
 - **MISO, SPP IM:** Resources can provide hourly Offers and modify them in Real-Time
- Differences in scope of products cleared:

Products Cleared	ISO-NE	PJM	MISO	SPP IM
Energy	✓	✓	✓	✓
(AS) Operating Reserve	-	-	✓	✓

Feature Overview: Real-Time Market

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Real-Time Market	✓	✓	✓	✓

- The Real-Time Market feature exists in all 4 RTOs and has the following:
 - Resources commitment status are provided by Day-Ahead Market results, RUC commitment results and/or changes to Current Operating Plan
 - Market clearing is based on resources Offers and short-term load forecast, and not demand bids
 - Market clearing is using Security Constrained Economic Dispatch (SCED)
 - Market clearing is performed on a 5-minute basis

Feature Overview: Must-Offer Requirement

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Must-Offer Requirement	✓*	✓*	✓*	✓

- The Must-Offer Requirement feature exists in all 4 RTOs and has the following:
 - Differences in scope:
 - PJM, ISO-NE:** Only resources with Capacity Supply Obligation (awarded through the Forward Capacity Market) are required to participate in the Day-Ahead Market
 - MISO:** All designated resources (except intermittent) are required to participate in the Day-Ahead Market
 - SPP IM:** Must-Offer requirement is based on a Market Participant's expected load forecast and their share of Operating Reserve

Feature Overview: Make-Whole Payment

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Make-Whole Payment	✓	✓	✓*	✓

- The Make-Whole Payment feature exists in all 4 RTOs and has the following:
 - Applies to Day-Ahead and Real-Time Markets
 - Applies as uplift payment to resources
 - Calculation is based on startup, no load, and Operating Reserve / Energy Offer
 - Charges are allocated to load resources in Day-Ahead and all schedule deviating resources in Real-Time
 - Difference in scope:
 - **MISO:** In addition to the standard make-whole payment, MISO also offers another type of make-whole payment, called Real-Time Price Volatility Make-Whole Payment, to protect the DA margin for generators if they offer their full ramp rate and follow ISO dispatch instructions in RT.

Feature Overview: Real-Time Market Settlement

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Real-Time Market Settlement	✓*	✓*	✓*	✓

- The Real-Time Market Settlement feature exists in all 4 RTOs and has the following:
 - Based on Real-Time prices and differences between Day-Ahead and Real-Time cleared amounts
 - Applies in Real-Time Market
 - Differences in scope:
 - **SPP IM:** the smallest Settlement reporting time granularity matches the Real-Time Market dispatch time granularity, on a 5-minute basis
 - **MISO, PJM, ISO-NE:** the smallest Settlement reporting time granularity is on a 1-hour basis, even though the Real-Time Market dispatch is performed on a 5-minute basis

Feature Overview: Operating Reserve - Reserve Zones

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Reserve Zones	✓*	✓*	✓*	✓

- The Reserve Zones feature exists in all 4 RTOs and has the following:
 - Allows the RTO to reserve enough deployable capacity in congested areas to ensure RTO footprint security and reliability
 - Differences in reserve zone price hedging capabilities:

Reserve Zone Price Hedge	ISO-NE	PJM	MISO	SPP IM
Bilateral (in Zone)	✓	✓	✓	✓
Self-Schedule (any Zone)	✓	✓	✓	✓
Physical Transfer (between Zones)	-	-	-	✓

1

- SPP IM:** provides Market Participants with a physical hedge on the differences in zonal prices

Feature Overview: Operating Reserve - External Reserve Transfer

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
External Reserve Transfer	-	-	-	✓

- The External Reserve Transfer feature exists only in SPP Integrated Marketplace and has the following:
 - Allows Market Participants with existing arrangements of reserve transfer capability originating from outside of the SPP footprint to preserve their contractual rights

Feature Overview: Marginal Loss Dispatch

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Marginal losses	✓*	✓*	✓	✓

- The Marginal Loss Dispatch feature exists in all 4 RTOs and has the following:
 - Dynamically captures the impact of system transmission losses in the system Economic Dispatch
 - Implemented in Day-Ahead and Real-Time Markets
 - Differences in loss over-collection (marginal loss surplus) distribution settlement scope :
 - ISO-NE:** on load ratio share basis
 - PJM:** on transmission service reservation basis
 - MISO, SPP IM:** on loss pool basis

Feature Overview: Co-optimization

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Co-optimization	✓*	✓*	✓	✓

- The Co-optimization (jointly clearing of Energy and Operating Reserve) feature exists in all 4 RTOs and has the following:
 - Differences in market systems applications scope:

Co-optimization	ISO-NE	PJM	MISO	SPP IM
Day-Ahead	-	-	✓	✓
Real-Time	✓	✓	✓	✓



- 1** - Energy and non-Regulation reserves are cleared jointly
 - Regulation Reserve is cleared with separate methodology (SPREGO)
- 2** - Energy and all reserve products are cleared jointly

Feature Overview: Combined Cycle Special Handling

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Combined Cycle Special Handling	✓*	✓*	✓*	✓

- The Combined Cycle Special Handling feature exists in all 4 RTOs and has the following:
 - Differences in the model scope:

Combined Cycle Models	ISO-NE	PJM	MISO	SPP IM
Single unit	✓	✓	✓	-
Aggregate units	✓	✓	✓	-
Configuration (logical) Units	-	-	-	✓

- Logical units are connected via a transition matrix. In contrast to the other models, configuration transitions costs incurred by Market Participants resources are captured and made whole

Feature Overview: TCRs/ARRs

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
TCRs/ARRs	✓	✓	✓	✓

- The TCRs (FTRs) feature exists in all 4 RTOs and has the following:
 - Provides congestion hedge
 - Monthly and annual auctions
- The ARR feature exists in all 4 RTOs and has the following:
 - Proceeds from TCRs/FTRs auction allocated to ARR holders
 - Differences in entitlement allocation scope:

Allocation methodology	ISO-NE	PJM	MISO	SPP IM
Historical peak load	✓	✓	✓	✓
Firm transmission reservation	-	-	-	✓

Feature Overview: Jointly Owned Resources

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Jointly Owned Resources	✓*	✓*	✓*	✓

- The Jointly Owned Resource feature exists in all 4 RTOs and has the following:
 - Provides MPs with different ownership shares on the same resource to offer their share of the physical resource
 - Differences in offering parameters and market clearing scopes:
 - **PJM, ISO-NE:** the RTO considers a single resource Offer and settles on ownership share percentage basis
 - **MISO:** each share is offered and treated (commitment and dispatch) independently
 - **SPP IM:** each share is offered independently and can be treated as such under certain registration criteria. Otherwise, commitment offer parameters are aggregated for commitment decisions of the physical resource, while dispatch decisions are based on the individual Energy and Operating Reserve Offers

Feature Overview: Virtual Transactions

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Virtual Transactions	✓	✓	✓	✓

- The Virtual Transactions feature exists in all 4 RTOs and has the following:
 - Transactions Offers and Bids are submitted and cleared in Day-Ahead Market only
 - Transactions are settled with Real-Time Market
 - Transactions are not tied to physical resources
 - Transactions can be defined at any Settlement Location

Feature Overview: Forward Capacity Market

Market Feature	ISO-NE	PJM	MISO	SPP Integrated Marketplace
Forward Capacity Market	✓	✓	-	-

- The Forward Capacity Market feature exists only in 2 RTOs (PJM and ISO-NE) and has the following:
 - Provides Market Participants with financial incentive to invest/procure enough capacity in the RTO footprint for the long term (up to 3 years)
 - Applies to supply (physical) and demand-side resources
 - Capacity auctions are held at least once a year
 - Regulatory environment in PJM and ISO-NE is retail open access

Conclusion

- The MWG has based most of its design on other operating RTO Markets in the Eastern Interconnect (PJM, MISO, NYISO, ISO-NE) in selecting the approach that best fits SPP footprint and Market Participants

MWG Report to MOPC - 01/12/2010

- Due to the unique nature of SPP footprint and its Market Participants, the existing designs from the other RTOs did not meet the full needs of the membership

MWG Report to MOPC - 01/12/2010

- Wherever needed and after extensive research and discussions, the MWG has either enhanced existing RTO processes or created new ones to best meet SPP Market Participants needs

- Design risk factors have been vetted by SPP market members participation to the market design process

Conclusion

- In its majority, The SPP Integrated Marketplace design remains conceptually similar to other existing RTOs