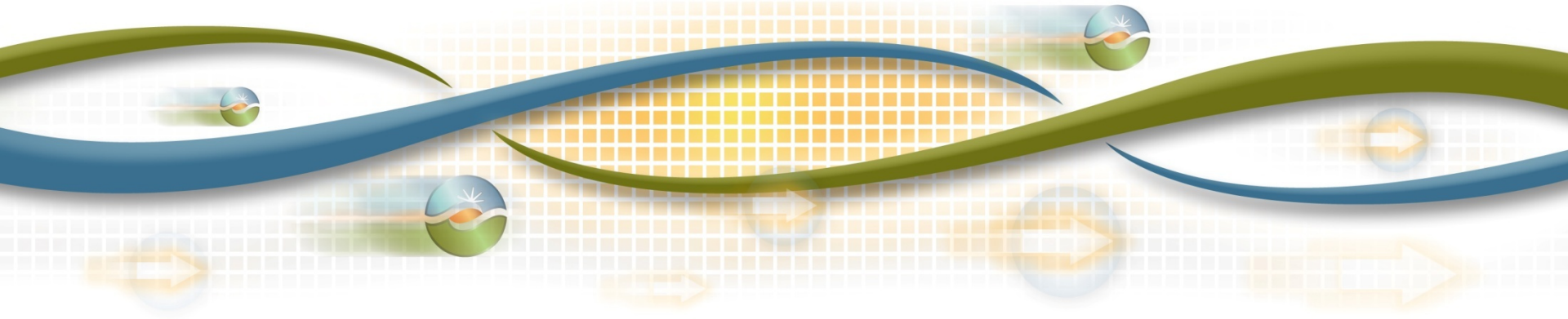




Contingency Modeling Enhancements

Draft Final Proposal
August 22, 2017

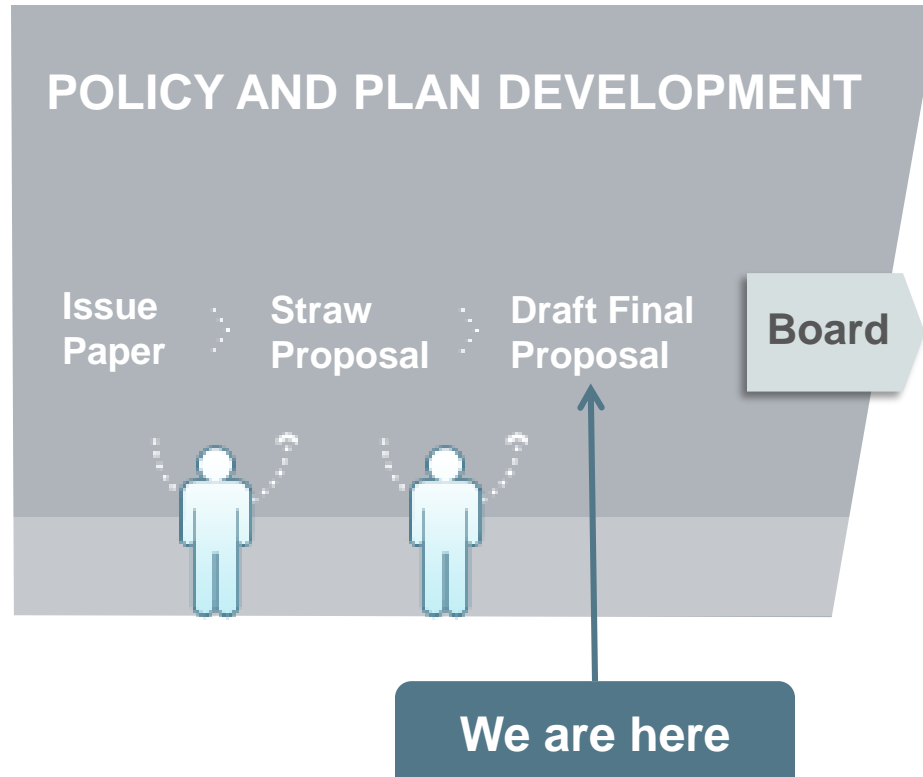
Perry Servedio
Sr. Market Design Policy Developer



Agenda

Time	Topic	Presenter
2:00-2:05	Introduction	Jody Cross
2:05-3:00	Background & objective	Perry Servedio
3:00-3:20	Stakeholder comments	
3:20-4:00	Changes to the proposal	
4:00-4:05	Next steps	

ISO Policy Initiative Stakeholder Process



BACKGROUND & OBJECTIVE

Background

- Released third revised straw proposal on 11/20/2015
 - Proposal included policy to maintain revenue adequacy in the CRR market
- Stakeholders had many questions about the CRR proposal
 - Stakeholders had similar non-CRR concerns as already expressed previously
- Presented CRR proposal to MSC on 12/11/2015
- Published a CRR discussion paper on 1/28/2016
 - Included nine options for stakeholders to weigh
 - Discussed these options with the MSC on 2/11/2016
 - Paper stated option selected would depend on results of technical analysis
- Continued work on technical analysis
 - Various issues with the software
 - Decided to evaluate 12 stressed scenarios covering spring and summer cases
 - Further decided to run in parallel to production for a two week period

Background

- Presented technical analysis preliminary results to MSC on 2/3/2017
 - MSC had questions about how the prototype behaves when it cannot economically clear less load
 - MSC had questions about if we verified benefits of using the CME vs. MOC
- Presented more technical analysis results to MSC on 7/10/2017
 - Finalized results from stressed scenarios
 - Results from parallel operations
 - Began to answer question related to load-clearing behavior

Objective

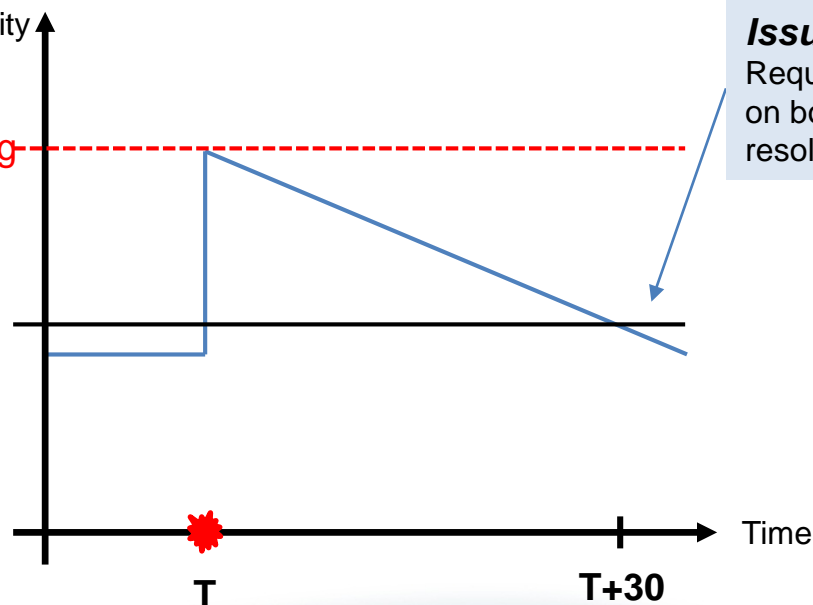
Resolve temporal transmission system reliability constraints in the market

- Improve economic dispatch
- Reduce reliance on exceptional dispatch and minimum online commitment constraints
- Appropriately value capacity needed to resolve actual transmission system reliability constraints

MW flow on transmission facility

30 minute facility emergency rating

Facility normal rating



Issue to resolve

Requires effective generation capacity on both sides of the constraint to resolve by T+30

Proposal

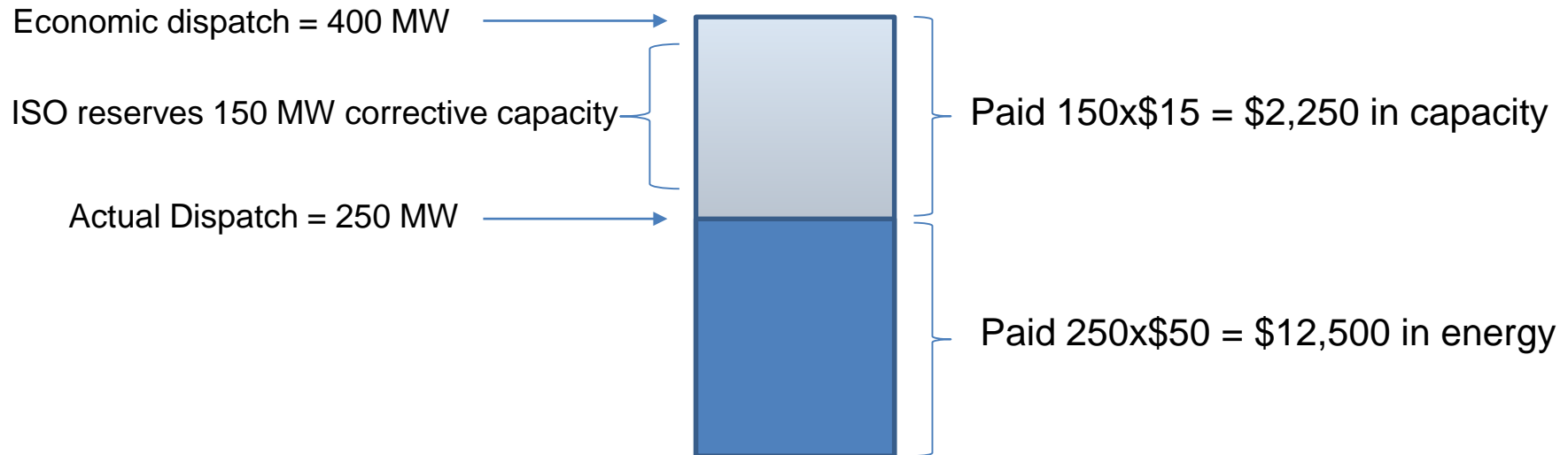
- Introduces the preventive-corrective constraint for use in the market
- Positions available resources so that the ISO has sufficient capability to respond to contingency events and return facilities to normal ratings within the emergency rating time frame
- Enhances the LMP formulation to provide market price signal related to this reliability constraint
- Creates a locational marginal capacity price (LMCP) which reflects:
 - a resource's opportunity costs,
 - marginal congestion cost savings, and/or
 - the marginal capacity value to follow dispatch.
- Pays resource for reserving the capacity at the LMCP

Proposal

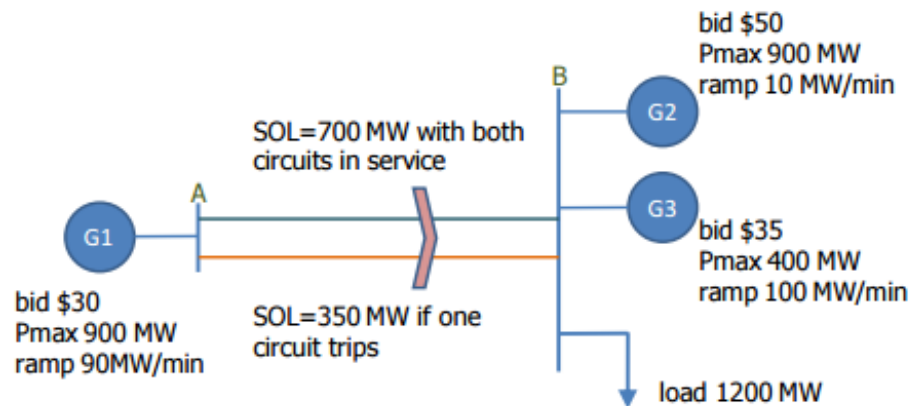
Resource paid for out-of-merit dispatch to reserve corrective capacity:

LMP = \$50

Bid = 400 MW for \$35



Proposal



energy in base case

Generator	P^0	λ^0	SF_{AB}^0	μ_{AB}^0	LMP	Bid Cost	Revenue	Profit
G1	700	\$50	1	-\$5	\$30	\$21,000	\$21,000	\$0
G2	250	\$50	0	-\$5	\$50	\$12,500	\$12,500	\$0
G3	250	\$50	0	-\$5	\$50	\$8,750	\$12,500	\$3,750

corrective capacity in contingency kc=1

Generator	ΔP^1	λ^1	SF_{AB}^1	μ_{AB}^1	LMCP ¹	Bid Cost	Revenue	Profit
G1	-350	\$15	1	-\$15	\$0	\$0	\$0	\$0
G2	200	\$15	0	-\$15	\$15	\$0	\$3,000	\$3,000
G3	150	\$15	0	-\$15	\$15	\$0	\$2,250	\$2,250

STAKEHOLDER COMMENTS

Stakeholder comments

- Six Cities, SCE, and SDGE are concerned about the impact of virtual bidding
 - ISO response: Virtual bids in the IFM will have the same impact on the preventive-corrective constraint as the preventive constraint today. Virtual supply and demand currently place flows on reliability constraints and the ISO cannot find a reason to differentiate the new constraint from existing. Also, virtual supply is not eligible to receive corrective capacity awards.
- Six Cities and SCE find limited benefits to implementing the policy
 - ISO response: The proposal clearly and transparently values energy through the LMP and capacity through the LMCP sending appropriate signals to the market related to locational scarcity of energy and capacity. The ISO can reduce its reliance on exceptional dispatch and minimum online commitment constraints.

Stakeholder comments

- SCE is concerned that the methodology is complex and therefore less transparent
 - ISO response: Having the market value capacity needed to meet reliability constraints improves overall market transparency, pricing, and dispatch. These benefits outweigh the perceived solution complexity.
- Calpine and NRG support the policy but are concerned that it does not allow participants to bid for corrective capacity
 - ISO response: There are no other costs besides energy opportunity costs that need to be accounted for. The proposed capacity pricing fully captures and compensates for the capacity needed to meet the reliability constraints.
- Stakeholders generally support the ISO's focus on potential revenue insufficiency in the CRR market
 - ISO response: Thanks for feedback on the many options to align the CRR market with the day-ahead market. The ISO proposes to auction and allocate CRRs that only settle on the preventive congestion components.

CHANGES TO PROPOSAL

Focus on NERC and Peak Reliability

- NERC refined its FAC standards over the years
 - WECC-TOP-007-1a became duplicative of the refined NERC FAC standards
 - WECC retired WECC-TOP-007-1a
- ISO must operate in accordance with the Peak RC's *SOL Methodology for the Operations Horizon*
 - **Operate within facility ratings.** After a contingency, ISO must return facilities to within normal ratings within a emergency rating corrective time frame
 - For a 30 minute emergency rating, we must return to normal within 30 minutes
 - For a 4 hour emergency rating, we must return to normal within 4 hours
 - Today, we use ED and MOC to respect these limits
 - **Interconnection Reliability Operating Limits.** For a stability risk or cascading outage risk, we must return to within limits in 30 minutes.
 - Today, we use ED and MOC to respect these limits

Intertie resource eligibility

- The market will settle all awarded corrective capacity
 - Intertie upward corrective capacity only awarded to AS certified intertie resources
 - Intertie downward corrective capacity can be awarded to any intertie resource
 - Intertie downward capacity modeled as available at no cost but may be priced
 - Potentially the LMP would not cover the full bid-cost of the intertie resource
 - Compensation of the LMP plus the LMCP for the intertie resource covers the full bid-cost of the intertie resource

Summary of technical analysis results

- **Stressed system scenarios**
 - Evaluated 12 stressed system cases
 - Six CME constraints
 - Spring case and summer case
 - Only one scenario has binding constraint (4 hours bind): SDGE peak load day
 - CME performs as expected, procures corrective capacity to resolve constraint, LMP and LMCP price impact.
- **Parallel operations**
 - Ran CME parallel to production day-ahead market for two weeks at the end of March 2017
 - No binding hours
- **Other MSC questions**
 - Ran CME in on a binding day with fixed load; commits units as expected
 - CME saved hundreds of MWs of commitment on example non-binding day
 - CME constraint resolves reliability criteria cheaper than MOC

Congestion revenue rights proposal

- Technical analysis results indicate that CME may rarely bind in the day-ahead market
- Keep it simple and monitor
- Propose to allocate and auction CRRs that will only settle on the preventive constraint congestion.
 - Allocation/Auction stays the same
 - CRRs only settle on the differences in the preventive constraint marginal congestion components
 - Preventive-corrective congestion revenues, if collected, will remain in the balancing account.
- Propose to monitor the preventive-corrective congestion revenues going forward

Congestion revenue rights proposal

- CRR settlement

$$CRR \text{ Payment} = CRR MW_{AB} \times (MCC_B^k - MCC_A^k)$$

NEXT STEPS

Next steps

- Stakeholder comments due on 08/31/2017
- Present to Board of Governors in September 2017

QUESTIONS