Southwest Power Pool

PRICE FORMATION TASK FORCE MEETING

August 24, 2016

AEP Offices – Dallas, TX

• S U M M A R Y O F M O T I O N S •

Motions:

Agenda Item 2 — Minutes Approval

Carrie Dixon (Xcel) motioned, and Jim Flucke (KCPL) seconded to approve the minutes for July 20, 2016. The motion passed with no oppositions and no abstentions.

Southwest Power Pool

PRICE FORMATION TASK FORCE MEETING

August 24, 2016
AEP Offices – Dallas, TX
• M I N U T E S •

Agenda Item 1 — Call to Order, Proxies, Agenda
Matt Moore (GSEC) called the meeting to order at 8:00 a.m. The attendance was recorded and the group reviewed the agenda. See Attachment 1 - PFTF Attendance August 24 2016 and Attachment 2 - PFTF Agenda for August 24 2016.

Agenda Item 2 — Minutes Approval
Carrie Dixon motioned, and Jim Flucke (KCPL) seconded to approve the minutes for July 20, 2016. The motion passed with no oppositions and no abstentions. See Attachment 3 – July 20 2016 Minutes.

Agenda Item 3 - Head-room and Head-room Transparency
Matt Moore facilitated discussion on Head-room and Head-room Transparency. Jim Flucke summarized the August 23, 2016 Market Working Group (MWG) discussion of RR173 Instantaneous Load Capacity for the group, stating Richard Ross planned to bring an RR to propose 50% in the Day-Ahead market. Jim noted he supports the 50% proposal.

Agenda Item 4 - MWP for DAMKT Cleared OR Not Cleared in RT
Topic deferred.

Agenda Item 5 - Multi-Day Economic Evaluation Review
Carrie Dixon (Xcel) presented her proposal to enhance the economic unit commitment and dispatch process by extending the current evaluation horizon. Carrie explained that economic unit commitments are not evaluated beyond the 24 hour period of the next operating day. Under the current SPP market design, long-lead time resources are likely to be committed only if a MP elects to self-commit or if it is needed for reliability reasons. Economic evaluation of resources with a startup time that is equal to or greater than 24 hours would allow the market to cycle resources more efficiently which is critical to further integration of renewables. Carrie also noted that the establishment of an economic de-commitment process could also help to alleviate prolonged periods of excess generation which creates severe depression on LMPs. Carrie believes extending the horizon of economic commitment and dispatch window beyond 24 hours of the next operating day will increase the overall efficiency of the market. The group discussed the proposal and voiced support to begin discussions to possibly develop this market design with the MWG. See Attachment 4 – PFTF Issue Submission-Xcel.

Agenda Item 6 - Over Production in Real-Time
Matt Moore explained the Over Production in Real-Time topic and noted that this is a concern GSEC brought to the PFTF. Matt explained there are often times a Resource may clear in the Day-Ahead market and is forced to run in Real-Time, even when LMPs are below their production cost due to forecast error. Further, if the Resource chooses to shut down, the Resource is assessed distribution charges. Matt requested that the group consider the question, if a Resource clears in the Day-Ahead

market and then sees negative prices in the Real-Time market, does it make sense for a Resource to continue to run, or should the Resource have the ability to buy-back its DA position? Matt stated he believes if a Resource clears in the Day-Ahead market and then sees low prices in the Real-Time market, that this should be an indication that the Resource should shut down. Matt clarified that GSEC is looking for the ability to buy-back the Day-Ahead position such that a Resource is not required to fulfill physical commitments in the Real-Time market. Moreover, Matt believes the Resource should be held harmless to Real-Time deviation charges. The group discussed the intent and possible solutions.

Agenda Item 8 - Ramp Product

Jared Greenwalt presented the Ramp Product presentation provided to the MWG in October, 2015. The group discussed whether or not this is something that should be revisited given FERC Order 825. See Attachment 5 – Ramp Product MWG 10202015.

Agenda Item 9 - Resource Unit Commitment in RUC Used for Rampable Capacity

Topic deferred.

Agenda Item 10 - Review PFTF Prioritized Task List

The group reviewed the PFTF Prioritized Task List and agreed to close the issue of connecting Day-Ahead and Real-Time clearing and the issue of make-whole distribution based on Real-Time deviations from a Day-Ahead Market position. See Attachment 6 – Concerns Matrix

Agenda Item 11 – Review of Motions, Action Items and Future Meetings

Action Items:

- No action items were taken

Future Meetings:

September 21, 2016 (8:00 a.m. – 12:00 p.m.)
Location: AEP Office – Dallas, TX
Room: 8th Floor

October 19, 2016 (8:00 a.m. – 12:00 p.m.)
Location: AEP Office – Dallas, TX
Room: 8th Floor

November 16, 2016 (8:00 a.m. – 12:00 p.m.)
Location: AEP Office – Dallas, TX
Room: 8th Floor

Agenda Item 11 – Adjournment

Matt Moore (GSEC) adjourned the meeting at 12:00 p.m.

Respectfully Submitted,

Debbie James
Secretary

X	= In Person	PFTF August 24, 2016 AEP in Dallas			
P	= By Phone				
*	= By Proxy				
Day 1	Full Name	Company	E-mail	Business Phone	Other Phone
X	Matt Moore (Chair)	Golden Spread Electric Coop	mmoore@gsec.coop	(806) 379-7766	
X	Carrie Dixon	Xcel Energy	carrie.e.dixon@xcelenergy.com		
X	Cliff Franklin	Westar	clifford.franklin@westarenergy.com	(443) 226-7787	
X	Jim Flucke	KCPL	jim.flucke@kcpl.com	(816) 701-7836	
X	Valerie Weigel	Basin Electric Power Co.	vweigel@bepc.com	(701) 557-5430	
P	Alan McQueen	SPP MMU	amcqueen@spp.org	(501) 614-3306	
P	Brian Rounds	AES Consulting	brian.rounds@aeslconsulting.com		
P	Chandler Brown	SECI	cwbrown@sunflower.net		
P	Chris Winburn	INDN	cwinbrun@indepmo.org		
P	David Daniels	SPP	ddaniels@spp.org		
X	Debbie James	SPP	djames@spp.org		
X	Erin Cathey	SPP	ecathey@spp.org		
X	Gary Cate	SPP	gcate@spp.org		
P	Ishwar Saini	Macquarie Group	ishwar.saini@macquarie.com		
P	Jack Madden	GDS Associates	jack.madden@gdsassociates.com		
X	Jared Greenwalt	SPP	jgreenwalt@spp.org	(501) 688-8314	
X	Jason Bulloch	SPP MMU	jbulloch@spp.org		
P	Jim Gonzalez	SPP	jgonzalez@spp.org		
P	Jodi Woods	SPP	jwoods@spp.org		
X	John Luallen	SPP	jluallen@spp.org		
P	John Tennyson	City Utilities	john.tennyson@cityutilities.net		
X	John Varnell	Tenaska	jvarnell@tnsk.com	(817) 462-1037	
X	Lee Anderson	LES	landerson@les.com	(402) 467-7591	
P	Micha Bailey	SPP	mcbailey@spp.org	(501) 688-2522	
P	Michael Erbrick	MICS/Dhastco	michael@dhast.com		
P	Nick Parker	SPP	nparker@spp.org	(501) 614-3574	
P	Patti Kelly	SPP	pkelly@spp.org	(501) 614-3381	
X	Rick Yanovich	OPPD	ryanovich@oppd.com		
P	Ricky Finkbiner	SPP	rfinkbeiner@spp.org		
X	Ron Thompson	NPPD	rfthomp@nppd.com	(402) 845-5202	
X	Roy True	Aces Power Marketing (APM)	royt@acespower.com	(317) 695-4146	(317) 695-4146
X	Shawn Geil	KEPCo	sgeil@kepco.org		
P	Temper Williams	SPP	trwilliams@spp.org		
P	Terry Wright	EDE	twright@empiredistrict.com		
P	Will Tootle	SPP	wtootle@spp.org		
P	Vince Vandaveer	SPRM	vince.vandaveer@cityutilities.net		
P	Yassar Bahbaz	SPP	ybahbaz@spp.org		

PRICE FORMATION TASK FORCE

August 24, 2016

Meeting

• A G E N D A •

8:00 a.m. – 12:00 p.m.

1. Call to Order, Proxies, Agenda Discussion *(8:00)* ..... Matt Moore
2. Minutes Approval *(8:05)*..... Matt Moore
    a. July 20 2016 Minutes
3. Head-room and Head-room Transparency ..... Matt Moore
4. MWP for DAMKT Cleared OR Not Cleared in RT .....Jared Greenwalt
5. Multi-Day Economic Evaluation Review..... Carrie Dixon
6. Over Production in Real-Time ..... Matt Moore
7. Break *(10:00)* .....Group
8. Ramp Product.....Jared Greenwalt
9. Resource Unit Commitment in RUC Used for Rampable Capacity..... Matt Moore
10. Review PFTF Prioritized Task List.....Erin Cathey
11. Review of Motions, Action Items and Future Meetings *(11:55)* .....Jared Greenwalt
12. Adjournment *(12:00)*..... Matt Moore

Southwest Power Pool

PRICE FORMATION TASK FORCE MEETING

July 20, 2016

AEP Offices – Dallas, TX

• S U M M A R Y O F M O T I O N S •

Motions:

Agenda Item 2 — Minutes Approval

Carrie Dixon (Xcel) motioned, and Jim Flucke (KCPL) seconded to approve the minutes for June 22, 2016. The motion passed with no oppositions and no abstentions.

Agenda Item 3 — Headroom Definition and Language Clarification Draft

Cliff Franklin (Westar) motioned and Jim Flucke (KCPL) seconded for PFTF to endorse the Head-room and Floor-room Clarification Revision Request. The motion passed with one opposition, Matt Moore (GSEC), and one abstention (BEPC).

Southwest Power Pool

PRICE FORMATION TASK FORCE MEETING

July 20, 2016

AEP Offices – Dallas, TX

• M I N U T E S •

Agenda Item 1 — Call to Order, Proxies, Agenda

Matt Moore (GSEC) called the meeting to order at 8:00 a.m. The attendance was recorded (*Attachment 1 - PFTF Attendance July 20 2016.xlsx*). Matt Moore held the proxy for Valerie Weigel (BEPC) (*Attachment 2 - Valerie Weigel Proxy.msg*). The group reviewed the agenda (*Attachment 3 - PFTF Agenda for July 20 2016.docx*).

Agenda Item 2 — Minutes Approval

Carrie Dixon (Xcel) motioned, and Jim Flucke (KCPL) seconded to approve the minutes for June 22, 2016. The motion passed with no oppositions and no abstentions (*Attachment 4 - June 22 2016 Minutes.docx)*.

Agenda Item 3 — Head-room/Floor-room Definition and Language Clarification Draft

Jared Greenwalt (SPP) presented a draft revision clarifying the definition and language around Head-room and Floor-room (*Attachment 5 - Head-Room and Floor-Room Clarification.docx)*. The revision changed the name to "Instantaneous Load Capacity" and simplified the language. A member was concerned that additional language was needed to describe excess capacity. The group modified the RUC inputs sections to reflect the concern**. Cliff Franklin (Westar) motioned and Jim Flucke (KCPL) seconded for PFTF to endorse the Head-room and Floor-room Clarification Revision Request. The motion passed with one opposition, Matt Moore (GSEC), and one abstention (BEPC).**

Agenda Item 4 — Head-room Commitment Impact

Gary Cate (SPP) presented the Head-room impact on commitment (*Attachment 6 - .July_PFTF_HR_Percentages.pptx*).

Agenda Item 5 – Headroom and Head-room Transparency

The group discussed the proposal to include Head-room (Instantaneous Load Capacity) in the Day-Ahead Market (*Attachment 7 - Head-room and Head-room Transparency - DRAFT_PFTF.docx).* It was noted that the make-whole payment would not be eliminated but moved to the Day-Ahead Market. If rampable capacity were cleared in the Day-Ahead Market, then load that did not participate in the Day-Ahead Market would not pay for it and thus it could be an incentive for load not to participate in the Day-Ahead Market. It was explained that this capacity in the Day-Ahead Market could reduce prices which is what would cause the price convergence. Stakeholders interested in moving forward with Head-room/Floor-room in the Day-Ahead Market will submit a Revision Request to the MWG. The PFTF is not endorsing a market design change at this time.

Agenda Item 6 –Regulation Selection Process

Jim Gonzalez (SPP) gave an overview of the Regulation selection process (*Attachment 9 - Regulation Selection Process.pptx*). Jim explained that a pool of Resources is selected 20 minutes prior to each Operating Hour, and then RTBM clears Regulation in each interval from that selected pool, deploying eligible Resources every four seconds. The group discussed the benefits of clearing Regulation in the Day-Ahead Market: a hedge for load for buying Regulation in Real-Time and price convergence of Day-Ahead Market and Real-Time Balancing Market. Jim explained that other options include using Short-Term ID-RUC (STRUC) to clear Regulation and a Regulation-only SCUC. Using STRUC would likely be a cheaper solution and more accurate since it is closer to Real-Time, but creating a new study would provide more benefit while being more costly to implement.

Agenda Item 7 – Day-Ahead to Real-Time Clearing Examples

Jared Greenwalt (SPP) explained two examples of Regulation clearing differently in Real-Time than it did in the Day-Ahead Market (*Attachment 10 - Day-Ahead to Real-Time Clearing Examples.pdf*). The group agreed that the market operated properly in both cases, and no revisions to market rules or procedures were necessary based on these two cases.

Agenda Item 8 – Scarcity Pricing

Matt Moore (GSEC) noted that SPP staff was working on a Revision Request to respond to the FERC order (*Attachment 11 - Shortage Pricing FERC Order_RM15-24-000_0616016.pdf*). SPP staff will need to meet the filing deadline, so the PFTF will not be able to review the Revision Request before it is filed.

Agenda Item 9 – New PFTF Issue Submissions

Cliff Franklin (Westar) explained his recently submitted price formation issues (*Attachment 13 - Westar PFTF Issues_Westar.docx; Attachment 14 - Demand Curves used for pricing OR relaxation events.pptx*). Cliff proposed a ramp shortage demand curve.

Agenda Item 10 – Review of Motions, Action Items and Future Meetings

Motions:

Agenda Item 2 — Minutes Approval

Carrie Dixon (Xcel) motioned, and Jim Flucke (KCPL) seconded to approve the minutes for June 22, 2016. The motion passed with no oppositions and no abstentions.

Agenda Item 3 — Headroom Definition and Language Clarification Draft

Cliff Franklin (Westar) motioned and Jim Flucke (KCPL) seconded for PFTF to endorse the Head-room and Floor-room Clarification Revision Request. The motion passed with one opposition, Matt Moore (GSEC), and one abstention (BEPC).

Action Items:

- No action items were recorded

Future Meetings:

August 24, 2016 (8:00 a.m. – 12:00 p.m.)
Location: AEP Office – Dallas, TX
Room: 8th Floor

September 21, 2016 (8:00 a.m. – 12:00 p.m.)
Location: AEP Office – Dallas, TX
Room: 8th Floor

October 19, 2016 (8:00 a.m. – 12:00 p.m.)
Location: AEP Office – Dallas, TX
Room: 8th Floor

Agenda Item 11 – Adjournment
Matt Moore (GSEC) adjourned the meeting at 12:26 p.m.

Respectfully Submitted,

Debbie James
Secretary

Attachments
Attachment 1 - PFTF Attendance July 20 2016.xlsx
Attachment 2 - Valerie Weigel Proxy.msg
Attachment 3 - PFTF Agenda for July 20 2016.docx
Attachment 4 - June 22 2016 Minutes.docx
Attachment 5 - Head-Room and Floor-Room Clarification.docx
Attachment 6 - .July_PFTF_HR_Percentages.pptx
Attachment 7 - Head-room and Head-room Transparency - DRAFT_PFTF.docx
Attachment 8 - Head-room and Head-room Transparency.pptx
Attachment 9 - Regulation Selection Process.pptx
Attachment 10 - Day-Ahead to Real-Time Clearing Examples.pdf
Attachment 11 - Shortage Pricing FERC Order_RM15-24-000_0616016.pdf
Attachment 12 - Shortage Pricing.pptx
Attachment 13 - Westar PFTF Issues_Westar.docx
Attachment 14 - Demand Curves used for pricing OR relaxation events.pptx

Issue to Be Addressed by the Price Formation Task Force

Title	Multi-Day Economic Evaluation
Submitter Name: Carrie Dixon	**Company:** Xcel Energy
Email: carrie.e.dixon@xcelenergy	**Phone:** (303) 571-6597

Describe in detail the price formation issue that you would like the PFTF to address. It may be helpful to provide examples.

The economic unit commitment and dispatch process could be enhanced by extending SPP's current evaluation horizon. Currently, economic unit commitments are not evaluated beyond the 24 hour period of the next operating day. Under the current SPP market design, long-lead time resources are likely to be committed only if a MP elects to self-commit or if it is needed for reliability reasons. Economic evaluation of resources with a startup time that is equal to or greater than 24 hours would allow the market to cycle resources more efficiently which is critical to further integration of renewables.

The establishment of an economic de-commitment process could also help to alleviate prolonged periods of excess generation which creates severe depression on LMPs.

Revising the criteria for making forward-looking economic commitment decisions beyond the current scope that is allowed in the SPP IM, in conjunction with the ability to make economic de-commitments, could provide footprint wide benefit by:

- Supporting Market Participants in making efficient operational and investment decisions
- Better commitment of long-lead time units
- Better coordination with natural gas transporters and suppliers
- Reduced production costs
- Improved reliability
- Facilitating further integration of renewables more efficiently

Explain how the issue relates to price formation.

Extending the horizon of economic commitment and dispatch window beyond 24 hours of the next operating day will increase the overall efficiency of the market.

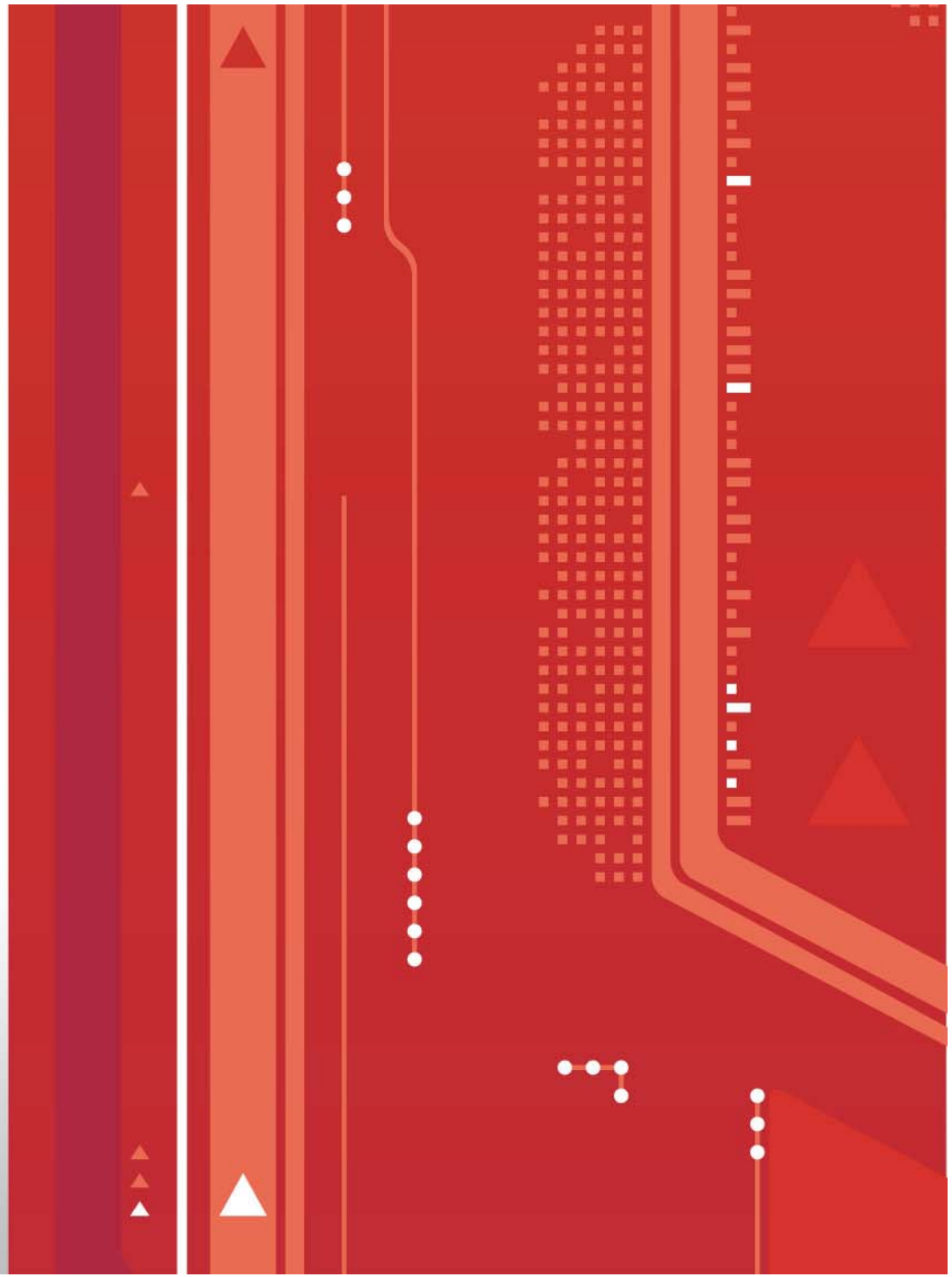
(Optional) Describe a proposed solution(s) that is acceptable or that is unacceptable and explain why. It may be helpful to provide examples.

Ramp Product Revisited

PFTF
8/24/2016

SPP Southwest Power Pool

INTEGRATED MARKETPLACE



Background

- Order 825 Changes Perspective
- Ramp Product Focus Group Overview
- Next Steps

RAMP PRODUCT FOCUS GROUP RECOMMENDATION – OCT 2016

INTEGRATED MARKETPLACE

SPP

Ramp Product High Level Design Concepts

Main idea

- Appropriately reward any resource that can provide ramping capability beyond its immediate dispatch level when that capability helps to meet a later interval's system requirements

Ramp product design concepts:

1. Determine time horizons for which ramp constraints apply
2. Formulate the system ramp constraints and add them to the RT dispatch problem
3. Co-optimize energy, operating reserve, and ramp capabilities to produce dispatch quantities and prices
4. Compensate the ramp designations for Resource commitments that increase the ramp capability at the co-optimized ramp product prices
5. Compensate Resource commitments that increase the ramp capability for an upcoming uncertainty period at time of commitment

Benefits of a Ramp Product

- **Ramp Management**
  - Provides a tool that is utilized based on economic incentives for the Resource in lieu of the RUC
  - Help solve intra hour ramp problems that exist
  - Help reduce RUC commitments by bridging the gap from one hour to the next
- **Economic Transparency**
  - Create economic market transparency as it related to the market value of ramp in SPP
- **Long-term Incentives**
  - Long-term economic incentive should be in place to entice the right technology to be built for the challenges that face SPP in the short, mid and long term
  - This includes any environmental issues and the addition of more wind and solar that is expected
- **Recent NOPR on Scarcity Pricing could have impact on potential benefits of a ramp product**

Problem Statements for the SPP Market

- What problem do we need to solve by adding a ramp product?
  - SCED dispatches inconsistently with how SCUC commits
    - SCED does not have look-ahead capability to ensure enough ramp is available beyond the current interval
    - SCUC does have look-ahead that can foresee future ramp needs
  - Rampable head-room is not priced and settled in the market
  - Currently there is no economic transparency for the market value of ramp

APPENDIX – PPT AS PRESENTED TO MWG IN OCTOBER 2015

Agenda

- MWG Action Item Review
- Recap of other RTO designs
  - CAISO
  - MISO
  - ISO-NE
- Benefits of a Ramp Product for the SPP Market
- Problem Statements for the SPP Market
- Next Steps

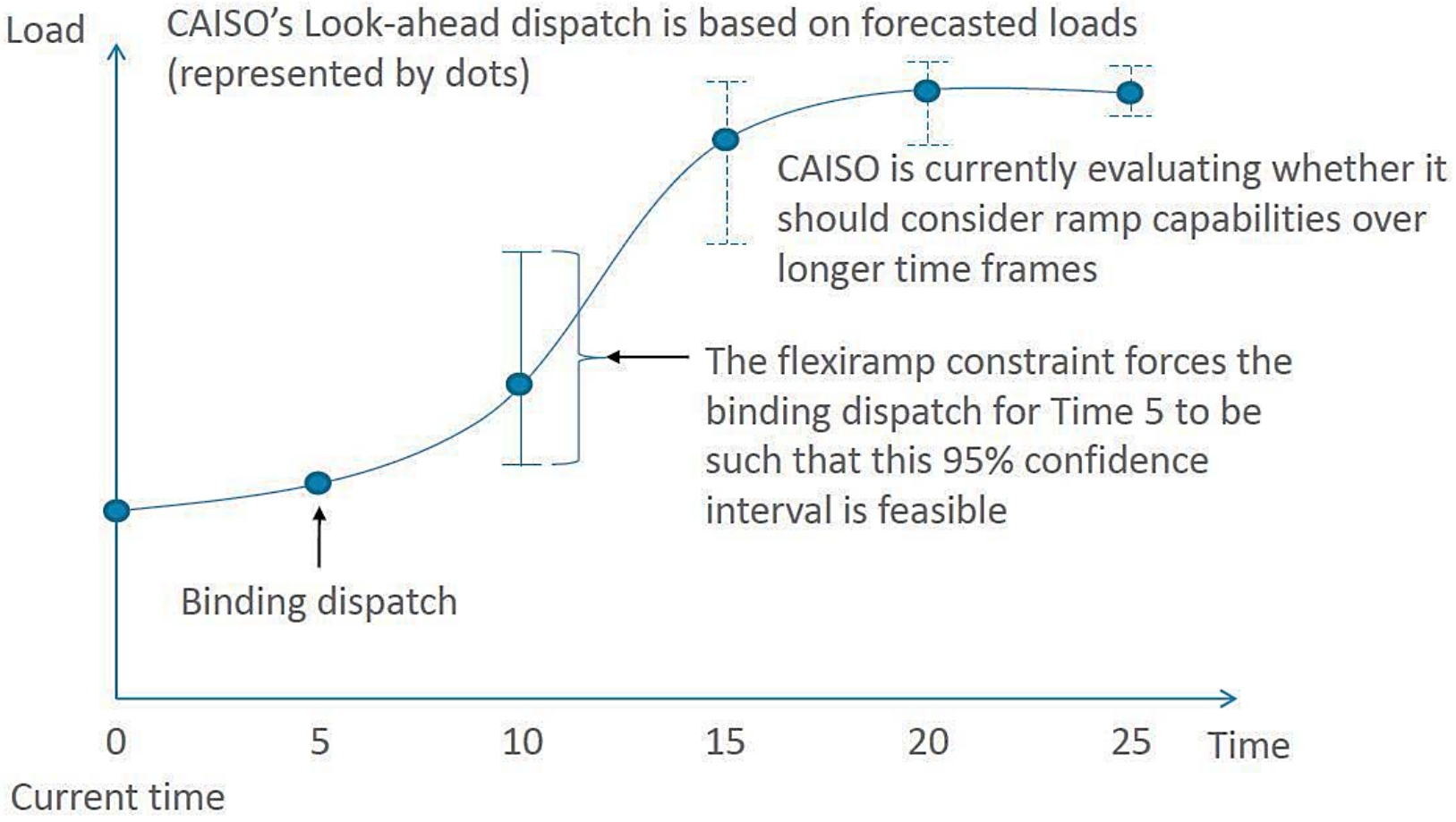
MWG Action Item Review

- MWG Action Item from 7/21/2015 meeting
  - Action item #278
  - Focus Group formed with two initial action items;
    1. research CAISO Ramp Market experience and bring details back to MWG, and
    2. determine benefits of Ramp Market to the overall SPP Marketplace and bring details back to MWG.

CAISO – Key ideas for flexible ramping products

- Flexiramp product constraints impose confidence intervals around the forecasted load level
- Purpose is to provide a “safety margin” in case actual load differs unexpectedly from the forecast
- There are flexiramp up and flexiramp down products
- Flexiramp capability is NOT the same as contingency reserves: a contingency is not required for flexiramp deployment

CAISO – Flexible ramping products



CAISO – Flexible ramping products

- There is no bidding for flexiramp products (assumes generators have no variable cost for providing unloaded ramp capability)
- Flexiramp products are co-optimized with energy and reserves
- Conceptually, prices for flexiramp products are based on opportunity costs (similar concept to RT reserve prices)

MISO – Ramp capability

- Very similar to CAISO flexiramp products in purpose and function
- Settlement rules are different

MISO – Ramp Product Design

- New ramp requirement per interval
- DAMKT and RTBM product
- All dispatchable Resources are eligible to clear ramp
  - No ramp offer price
  - MCE decides which Resources to clear ramp
  - All cleared Resources are paid the marginal opportunity cost
- New ramp demand curves
  - MISO has done studies using $5 and $10 demand curves with similar results
  - Deploy ramp through current RTBM dispatch when requirement is not met within demand curve
- Ramp Product design similar to Op Reserve model design

MISO – Ramp Capability Needs

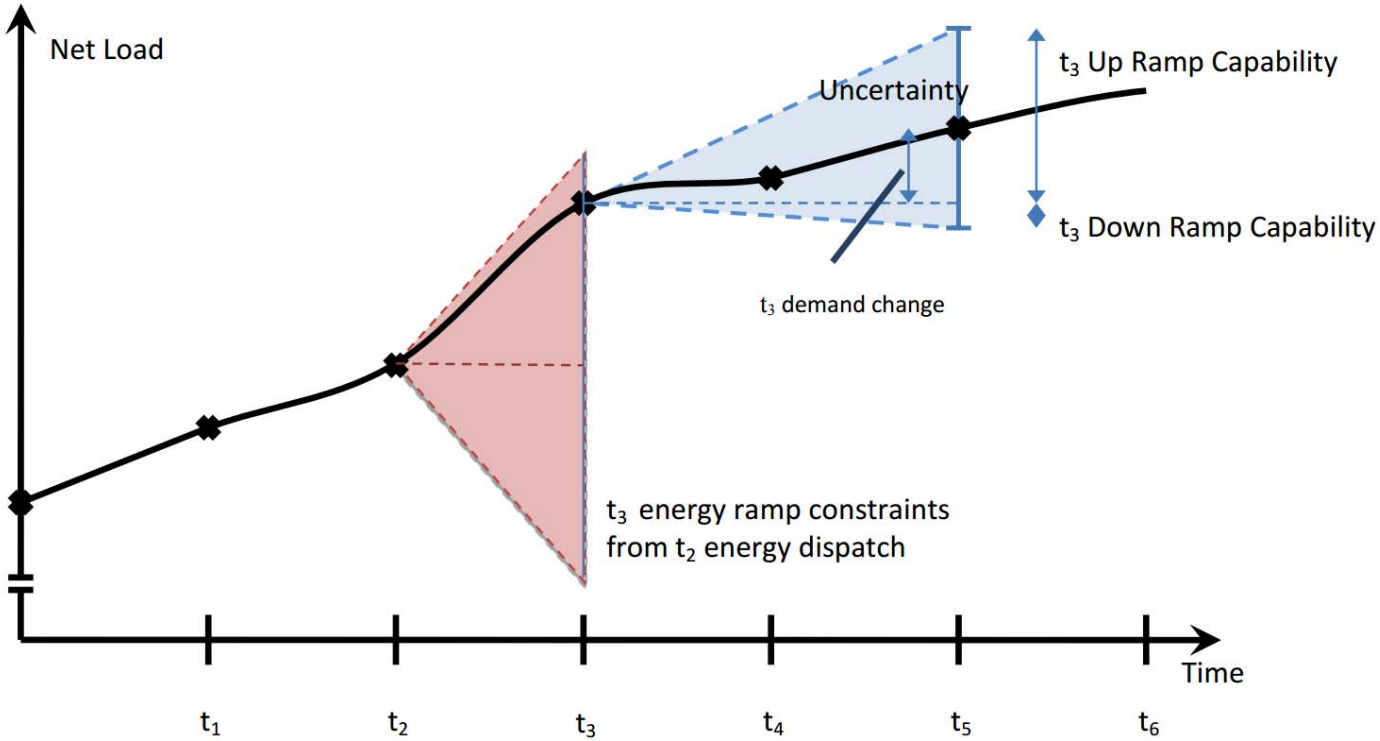


Diagram from "Ramp Capability Product Design for MISO Markets," Dec 22, 2013, white paper available at misoenergy.org

Up Ramp Capability = (t_5-t_3 demand change) + (uncertainty factor)

Down Ramp Capability = (-1)((t_5-t_3 demand change) – (uncertainty factor))

MISO – Ramp Product Cost Allocation

- The costs of ramp capability are expected to be allocated like the costs of the existing Operating Reserves since ramp capability is similarly needed for reliable system operations
- Cost allocated to causers vs benefiters
  - Allocating to causers would require complex rate structures
  - MISO proposes to allocate costs to primary benefiters (i.e. load and exports)
    - Same way contingency reserves are allocated

MISO Study

- MISO is currently working on a Ramp Capability Product design
  - MISO cost-benefit studies show potential annual savings of $3.8M-5.4M
    - SPP and MISO designs differ when it comes to Operating Reserve scarcity due to ramp. SPP relaxes the constraint and resolves, while MISO violates which force penalized prices into the LMP.
    - Part of the MISO potential savings is related to the reduction of these high prices, which SPP will not see due to the difference in current design.
- MISO studies demonstrate that through the use of the ramp capability products the system can be:
  - In a better position to address short term ramp needs, and
  - Prepared to addresses increases in the ramp capability requirements while realizing a tangible cost savings.

Different RTO assumptions

- Conditions specific to the CAISO system make managing very-short-term load forecast uncertainty important
  - MISO design is very similar in purpose
- ISO-NE ramp products being proposed are focused exclusively on multi-hour pre-ramping concerns
  - Pre-ramping is needed to ensure system reliability
  - Pre-ramping issues arise because the ISO does not have the ability to optimally dispatch units for sustained system load ramps

NE-ISO Current Practices

- Current ISO practices for pre-ramp
  - Manual Dispatch
    - Will always pre-ramp selected units
    - Dispatch is not efficient
  - Reserve Bias: increase reserve requirement
    - May not work
    - Inflates RMCPs
    - Dispatch is not efficient
- Pre-ramping affects dispatch and pricing outcomes
  - Total cost, total market payments, total side-payments, and dispatch-following incentives change depending on the pre-ramping method and implementation

NE-ISO Design

- Ramp products can be both up and down (satisfy pre-ramping needs in both directions)
- Ramp product designations and requirements are distinct from reserve designations and requirements
  - The TMOR requirement for the "non-immediate" interval will be factored into the ramp requirement (i.e., net load change + projected TMOR)
  - This treatment recognizes that a generator's TMOR and its 30-minute ramp product capability physically represent the same capability
- Ramp product price is an opportunity cost payment

Next Steps

- Is the MWG action item #278 satisfied?
- MWG guidance on next steps

UID	#	Issue	Submitted By
1	8	**Headroom** processes should be examined to determine if the existing process for Headroom commitment is being properly reflected in the LMP's while reducing the uplift charges to the market. In addition, the commitment of Headroom should not mask the need for the development of what could be other market based products such as ramping, a 30-60 minute contingency reserve product, redefining and expanding the supplemental time frame or market based primary frequency response.	GSEC
2	8	**Headroom** processes should be examined to determine if the existing process for Headroom commitment is being properly reflected in the LMP's while reducing the uplift charges to the market. In addition, the commitment of Headroom should not mask the need for the development of what could be other market based products such as ramping, a 30-60 minute contingency reserve product, redefining and expanding the supplemental time frame or market based primary frequency response.	GSEC
3	3	Proper Pricing and Deployment of Regulation Services and Energy in Real Time	Dogwood
4	3	Proper Pricing and Deployment of Regulation Services and Energy in Real Time	Dogwood

5	8	**Headroom** processes should be examined to determine if the existing process for Headroom commitment is being properly reflected in the LMP's while reducing the uplift charges to the market. In addition, the commitment of Headroom should not mask the need for the development of what could be other market based products such as ramping, a 30-60 minute contingency reserve product, redefining and expanding the supplemental time frame or market based primary frequency response.	
6	6	**Scarcity pricing** should be examined to determine if participants are being compensated for the services they are providing in the interval they are providing it.	GSEC
7	5	Lack of Multi-Day Resource "Reliability Coordination" Activity by SPP Leading to Over-Commitment of Resources by Market Participants	Dogwood
8	10	**Over production** in the real-time market should be examined. Resources should not be required to meet a Day Ahead commitment when the LMP is below production cost in real-time. This should hold true for all Resources but especially Quick Start Resources.	GSEC
9	10	**Over production** in the real-time market should be examined. Resources should not be required to meet a Day Ahead commitment when the LMP is below production cost in real-time. This should hold true for all Resources but especially Quick Start Resources.	GSEC
10	1	Excessive Volatility of SPP IM Real Time Energy Pricing	Dogwood
11	2	Make Whole Payment Allocation Based on Real Time Imbalance Deviation from Day Ahead Schedule Rather than Deviation from Deployment Signal	Dogwood

12	15	Transmission/Resource Outages Coordination	NPPD
13	6	**Scarcity pricing** should be examined to determine if participants are being compensated for the services they are providing in the interval they are providing it.	GSEC
14	15	Transmission/Resource Outages Coordination	NPPD
15	4	Mitigation of Resource Offers to "Cost plus 10%" Rather than "Cost" as a Reasonable Proxy for Cost Recovery in FERC-Regulated Energy Markets	Dogwood
16	7	**Violation Relaxation Limit Process** – The existing VRL process should be examined to determine if the protocols and related process are distorting LMP's during any circumstance.	GSEC
17	11	**Transparency** related to manual commitments, RUC's and Headroom should be posted for the Market Participant on a more frequent basis to ensure the Resource owner knows why the Resource was committed beyond normal market processes. In addition, the number of manual and RUC instances should be posted.	GSEC
18	11	**Transparency** related to manual commitments, RUC's and Headroom should be posted for the Market Participant on a more frequent basis to ensure the Resource owner knows why the Resource was committed beyond normal market processes. In addition, the number of manual and RUC instances should be posted.	GSEC
19	9	The **unit commitment** process should be reflected in the LMP to properly reflect the value for a particular unit and particular need while also reducing uplift to the market.	GSEC
20	16	Improved coordination between slower and faster ramping units where faster ramping units are compensated	NPPD

21	12	The ability of **Block Loaded fast start Resources** to set LMP should be examined.	GSEC
22	13	Intermittent Resources Management adds costs to the Market	NPPD
23	13	Intermittent Resources Management adds costs to the Market	NPPD
24	13	Intermittent Resources Management adds costs to the Market	NPPD
	17	Scarcity Pricing appropriate for SPP Market based upon relaxation of Reserve Requirements	Westar
	18	Multi-Day Economic Evaluation	Xcel
	18	Multi-Day Economic Evaluation	Xcel

Market Concern
Resources are committed for Headroom which is used for rampable capacity. These commitments create uplift when these Resources are not profitable and make pricing non-transparent.
Resources are committed for Headroom which is used for rampable capacity. These commitments create uplift when these Resources are not profitable and make pricing non-transparent.
Resource can clear Regulation in the Day-Ahead Market, then, in Real-Time, not be cleared for Regulation. When MCPs are higher, the Resource must buy back its Day-Ahead position at a higher price.
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Resources are committed for Headroom which is used for rampable capacity. These commitments create uplift when these Resources are not profitable and make pricing non-transparent.
Scarcity Pricing should occur during the interval in which the product was scarce. The scarcity price should value the provided product properly. Scarcity prices should not be reduced or avoided by over-commitment.
High wind generator output and high levels of self-commitment cause an un-optimized, over-commitment, and thus too many Resources to be on-line.
Over-production of Energy as a result of over commitment or a needless requirement can lead to depressed, inefficient price signals.
Over-production of Energy as a result of over commitment or a needless requirement can lead to depressed, inefficient price signals.
Real-Time LMPs vary from Day-Ahead LMPs such that the Day-Ahead Market does not provide a sufficient hedge for RTBM.
Make Whole Payment Allocation Based on Real Time Imbalance Deviation from Day Ahead Schedule Rather than Deviation from Deployment Signal.

The current coordination of scheduled transmission outages increases the risk of more congested flowgates and the volatile prices that tend to follow in RTBM.
Scarcity Pricing should occur during the interval in which the product was scarce. The scarcity price should value the provided product properly. Scarcity prices should not be reduced or avoided by over-commitment.
The current coordination of scheduled transmission outages increases the risk of more congested flowgates and the volatile prices that tend to follow in RTBM.
When offers are mitigated to short-run marginal cost, Resources cannot recover their necessary costs.
VRLs relax constraints to allow economic dispatch to solve. By relaxing the very need for these available services and technologies, the pricing and the very need for these services are diminished.
Resource owners are not sufficiently aware of why their Resource is committed and how often market Resources are committed manually and by RUC.
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Start-up and no-load costs are not included in LMP. Therefore the LMP does not reflect these costs and thus the value of certain Resource types. This also increases uplift charges.
When wind Resources do not produce as forecasted, scarcity prices can occur and create price volatility in Real-Time.

Anytime a Resource is not allowed to set LMP then there is a clear direct connection with price formation. **Block loaded Fast Start Resources** should be allowed to set LMP. Other markets are taking steps to ensure this is the case.
VERs increase the production cost of the market by increasing the Operating Reserve (OR) requirement and by causing scarcity, which leads to scarcity pricing.
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The current scarcity curve is too steep and does not correctly reflect the cost of BTM generators and off-line fast start peaking generation.
Currently, economic unit commitments are not evaluated beyond the 24 hour period of the next operating day. Under the current SPP market design, long-lead time resources are likely to be committed only if a MP elects to self-commit or if it is needed for reliability reasons.
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Proposed Solution	Regulation Deployment	Real-Time Price Volatility	Mitigated Offers	Over-Commitment of Resources	Scarcity Pricing	Violation Relaxatio (V	He
Make headroom a market-based solution instead of a RUC-based solution so that the need is reflected in LMP.							X
Clear for headroom in the Day-Ahead Market.							X
Connect Real-Time clearing with the Resource's Day-Ahead position.	X	X					
Create a make-whole payment for a Resource that is cleared for Regulation in the Day-Ahead Market but does not get cleared for Regulation in Real-Time.	X	X					

Create a ramp product.							X
Disallow SPP's temporary use of Operating Reserve to meet ramp requirements.	X				X		
SPP or the Market Monitor should publish a forecast describing the predicted mix of generation types that will provide the optimal solution.				X			
Allow some committed Resources to be dispatched to zero MWs if LMPs do not merit running the Resource.							
Allow Resources to buy back its Day-Ahead position without being charged MWP distribution.							
Lower scarcity pricing demand curves.		X			X		
Change Make Whole Payment allocations to dispatchable Resources to be based on failed commitments and deviations from Real Time deployment signals rather than just deviations from Day Ahead award schedules. Alternatively, eliminate allocation of Make Whole Payments to dispatchable Resources and allow deployment failure penalties to adequately incent Resources to follow deployment signals.							

Improve the process for coordinating transmission outages so that flowgate congestion is reduced, and thus, price volatility is reduced.							
Develop an Operating Reserve Demand Curve (ORDC).					X		
Possibly apply penalties when a planned, scheduled outage is not followed.							
Change mitigated offer rules to reduce the offer to cost plus ten percent.			X				
Do not relax constraints related to VRLs. Allow the price to reflect the VRL.						X	
The number of manual commitments and RUCs should be posted.							
Post the reason for a Resource's manual commitment or RUC for the Market Participant (e.g., Regulation, additional Operating Reserve, Headroom, rampable capacity, etc.).							
Incorporate start-up and no-load costs into LMP by developing extended LMP.							
Create a process where slower ramping Resources are used in the early stages of operation needs, and faster ramping resources are available for use later and are compensated accordingly.		X			X		

Block loaded Fast Start Resources could be allowed to set LMP through mechanisms such as ELMP which had been addressed in MISO.							
Make VERs more accountable in scarcity pricing events.		X			X		
Make VERs more accountable for the additional Operating Reserve they require to reliably operate.	X						
Develop a process where the AO is made whole if the generation unit is harmed by deployment levels in the Real Time Market.	X						
Create an Operating Reserve scarcity demand curve based upon the top of the SPP fast-start resource stack and BTM resource costs which pricing will be applied when SPP has to relax either VRL or Operating Reserve Requirements. The curve would be based on a Heat Rate gas price generated daily based on both daily gas prices and the costs of the heat rate demand curve (top of supply stack + BTM generation costs).					X		
Economic evaluation of resources with a startup time that is equal to or greater than 24 hours would allow the market to cycle resources more efficiently which is critical to further integration of renewables.							
The establishment of an economic de-commitment process could also help to alleviate prolonged periods of excess generation which creates severe depression on LMPs.				X			

on Limits (VRL)	adroom	Start-Up and No-Load Costs	Over-production	Transparency	Variable Energy Resources (VERs)	Transmission Outage	Level of Effort (1 = Easy)	Importance (1 = Mos Importa	Ove
						High	1	**3.33**	
						Low	2	**3.33**	
						High	3	**4.67**	
						High	4	**4.67**	

					Medium	5	**6.00**
					High	6	**6.33**
					Medium	7	**9.67**
	X				High	8	**9.67**
	X				High	9	**9.67**
					Medium	10	**10.00**
					High	11	**10.00**

				X	High	12	**10.00**
					Medium	13	**10.33**
				X	High	14	**11.33**
					Medium	15	**11.67**
					High	16	**12.00**
		X			Low	17	**12.00**
		X			Low	18	**12.67**
X					High	19	**13.67**
					Medium	20	**17.67**

		X			High	21	**18.33**
			X		High	22	**19.33**
			X		High	23	**19.67**
			X		High	24	**20.00**
		X					
	X						

st nt) erall Rank SPP Comment
Headroom/Floorroom is currently part of the SCUC and used to commit enough rampable capacity to meet the instantaneous load above/below the average load. It must be added to the SCED for pricing.
Determine appropriate hourly headroom values.
Integrate DAMKT results with the RUC and Regulation selection process. How do you relax the DAMKT Regulation requirement when there is a reliability issue?
Significant effort to define the market rules around another MWP.

Leverage ramp product market design work performed by the Ramp Product Focus Group.
Integrate this discussion with the FERC Order related to the AD14-14 NOPR on shortage pricing.
Use SPP public information request process and monitor Stakeholder Prioritization Quarterly Meeting (SPQM) process.
Day-Ahead committed QSRs are allowed a zero dispatch without MWP penalties. Settlement could be significant.
Day-Ahead committed resources are exempt from MWP distribution charges.
There is significant effort to determine the appropriate demand curve price, and to incorporate demand curves in software and business processes. If the demand curve is set too low, violations become more frequent, and if it is set to high it could have a significant price impact.
SPP working with Rob Janssen on the Dogwood Energy MWP issues. Significant effort to re-define MWP market rules.

Already discussed with ORWG as part of the TCR Outage Sub-Group
There is significant effort to determine the appropriate demand curve price, and to incorporate demand curves in software and business processes. If the demand curve is set too low, violations become more frequent, and if it is set to high it could have a significant price impact.
Already discussed with ORWG as part of the TCR Outage Sub-Group
MMU and FERC hurdle could be high.
Current VRLs are used to encourage the MCE to respect system constraints until it reaches the VRL price threshold while allowing MCE to find a solution. The alternative to VRLs is demand curves . There is significant effort to determine the appropriate demand curve price, and to incorporate demand curves in software and business processes. If the demand curve is set too low, violations become more frequent, and if it is set to high it could have a significant price impact.
Use SPP public information request process and monitor Stakeholder Prioritization Quarterly Meeting (SPQM) process.
Manual commitment reasons could be identtified. The reason for RUCs is not available since there is no single reason identified in the SCUC for the unit commitment. All resources are committed economically to meet the input requirements. Use SPP public information request process and monitor Stakeholder Prioritization Quarterly Meeting (SPQM) process.
Significant effort to define the market rules around ELMP eligibility rules and evaluate the impact.
Leverage ramp product market design work performed by the Ramp Product Focus Group.

Significant effort to define the market rules around ELMP eligibility rules and evaluate the impact.
Requires development of cost allocation methodolgy and could require significant Settlement changes.
Requires development of cost allocation methodolgy and could require significant Settlement changes.
Combine with Dogwood Energy Issue #1.