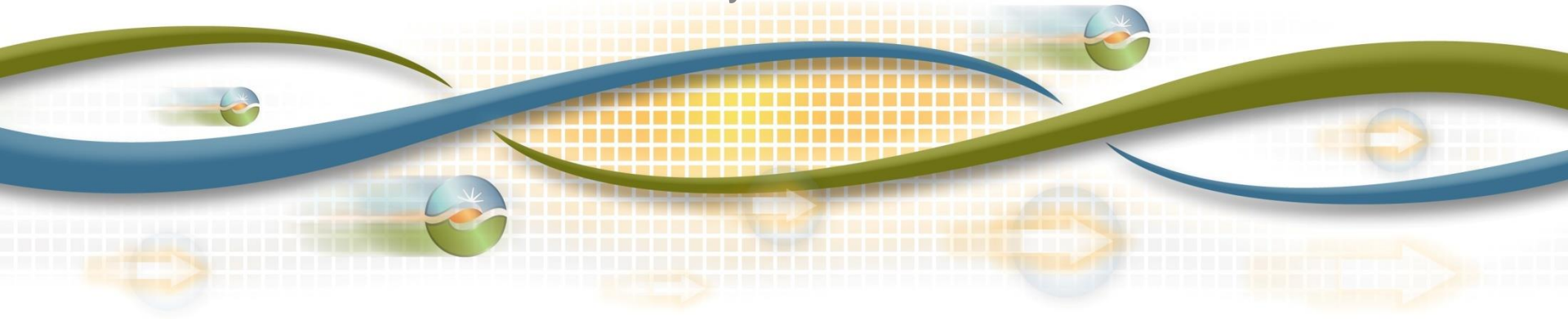




Commitment Costs and Default Energy Bid Enhancements – Draft Final Proposal

August 30, 2017

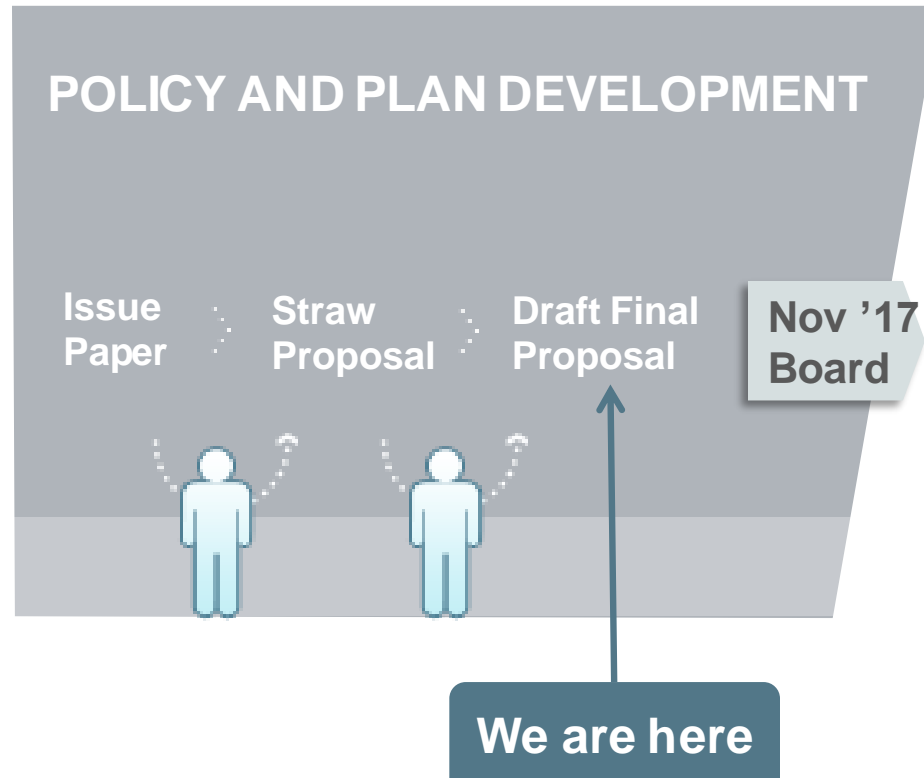
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August 30, 2017 agenda

Time	Topic	Presenter
10:00-10:05	Introduction	Kim Perez
10:05-10:10	Summary	Cathleen Colbert
10:10-11:30	CAISO responses to stakeholder comments on revised straw proposal	Cathleen Colbert
11:30-12:00	Stakeholders requested clarification on revisions to proxy costs under proposal	Cathleen Colbert

ISO Policy Initiative Stakeholder Process



Plan for stakeholder engagement

Milestone	Date
Issue paper posted	November 18, 2016
Stakeholder call	November 22, 2016
Stakeholder written comments due	December 9, 2016
Straw Proposal Posted	June 30, 2017
Stakeholder meeting	July 6, 2017
Stakeholder written comments due	July 20, 2017
Revised straw proposal	August 1, 2017
Stakeholder meeting	August 3, 2017
Stakeholder call	August 11, 2017
Stakeholder written comments due	August 15, 2017
Draft final proposal posted	August 18, 2017
Stakeholder call	August 30, 2017
Stakeholder written comments due	September 11, 2017
EIM governing body meeting	October 10, 2017
Board of Governors meeting	November 1-2, 2017



EIM Categorization

- This initiative will affect the real-time market
- The EIM is an extension to the real-time market
- This initiative is EIM related
- EIM Governing Body – E2 classification (Advisory)

“For a policy initiative proposing changes to generally applicable real-time market rules or rules that apply to all ISO markets, the matter goes to the Board for approval; however, the EIM Governing Body has the option to provide advisory input.”

<http://www.caiso.com/Documents/GuidanceforHandlingPolicyInitiatives-EIMGoverningBody.pdf>

SUMMARY

Objective: Comprehensive solution to ongoing commitment cost and DEB issues

- Suppliers need more flexibility to reflect unique costs and volatility
 - Support integration of renewable resources through incentivizing flexible resources participation during tight fuel supply
 - Account for costs of flexible resources (gas and non-gas) to reduce risk of insufficient cost recovery
 - Encourage participation of non-RA and voluntary EIM resources
- ISO needs to comply with FERC Order 831
 - Requires supporting verified costs of energy bids above \$1,000/MWh

ISO proposes to allow market based offer for “three-part bid” subject to mitigation and allow greater flexibility to negotiate or adjust each component to support market efficiency

		Type	Sub-type	Market Based Offer	Cost Based Offer
Hourly	Energy		Variable Cost	X	Mitigated Price
	MLC		Variable Cost	X	Mitigated Proxy Cost
		Fixed Cost			
Daily	TC		Fixed Cost	X	Mitigated Proxy Cost
	SUC		Fixed Cost	X	Mitigated Proxy Cost

CAISO summary of proposals

Issue	Proposal
Bidding rules may limit ability to reflect changes in minimum load costs hourly or to select hours for participating in market even when not subject to must-offer obligation	Support hourly minimum load offers
	Apply settlement rules when no minimum load cost offer present
	Apply settlement rules to settle exceptional dispatches at commitment cost bids considered in initial instruction for the instruction period
Reference levels may not reasonably reflect impact of externalities or suppliers' cost expectations	Add negotiated option for commitment cost reference levels
	Allow Supplier provided ex ante reference levels adjustments subject to verification requirements
	Re-calibrate penalty price parameters to support possibility of energy offers at \$2,000/MWh
	Establish merit order above \$2,000/MWh cap for ex ante verified energy adjustments while limiting price impacts at cap
Commitment cost mitigation may be overly restrictive since ISO only supports cost-based offers that must fall within a reasonable range of reference levels established by 125% cap	Make permanent after-the-fact filing right at FERC for energy costs
	Support market-based commitment cost offers subject to caps
	Apply dynamic market power mitigation to commitment cost components
	Apply mitigation to resources within a minimum online constraint for reactive power or voltage concerns
Commitment cost mitigation may be overly restrictive since ISO only supports cost-based offers that must fall within a reasonable range of reference levels established by 125% cap	Apply results of market power mitigation on commitment costs to default assessment for exceptional dispatches

CAISO summary of stakeholder positions

Item	Positions
Support hourly minimum load offers	Broadly supports
Apply settlement rules when no minimum load cost offer present	Broadly supports
Apply settlement rules to settle exceptional dispatches at commitment cost bids considered in initial instruction for the instruction period	Seeking comments
Add negotiated option for commitment cost reference levels	Broadly supports
Allow Supplier provided ex ante reference levels adjustments subject to verification requirements	Broadly supports
Re-calibrate penalty price parameters to support possibility of energy offers at \$2,000/MWh	FERC Order 831 Requirement
Establish merit order above \$2,000/MWh cap for ex ante verified energy adjustments while limiting price impacts at cap	FERC Order 831 Requirement
Make permanent after-the-fact filing right at FERC for energy costs	Broadly supports if its backstop to CAISO after-the-fact process
Support market-based commitment cost offers subject to caps	Broadly supports if set to initial conservative level at 200%
Apply dynamic market power mitigation to commitment cost components	Broadly support
Apply mitigation to resources within a minimum online constraint for reactive power or voltage concerns	No broad support/opposition
Apply results of market power mitigation on commitment costs to default assessment for exceptional dispatches	No comments

CAISO RESPONSES TO STAKEHOLDER COMMENTS ON REVISED STRAW PROPOSAL

Section 8.1 - Proposals to support hourly minimum load offers

Stakeholder comments on proposed changes to re-bidding rules including the ability to revise bids below “locked” bid

- CAISO’s revised straw proposal included proposed revisions to real-time market re-bidding rules that would:
 - Use average of a supplier’s MLC bid during RTUC process that resulted in the binding unit commitment i.e. locked bid
- Six Cities and NV Energy supported use of an average bid as “locked” bid
- SCE remains unclear and sought clarity on calculating average “locked” price
- PGE, NRG, and WPTF support maintaining existing rules that lock at exact price level of last bid submitted but supports allowing re-bidding below
- CAISO received requests to clarify how re-bidding rules would be applied to exceptional dispatches

CAISO response on revised proposal to remove proposed changes to re-bidding rules including the ability to revise bids below “locked” bid

- CAISO revised its proposal to remove the proposed revisions to the RTM re-bidding rules and to remove ability to revise bids below those locked levels
- Market optimization would not be affected by revising bids below the average or last bid since it is under inter-temporal constraints
- No longer concern since STUC constraints commitments to those units with start-up and minimum run time less than the horizon
 - STUC will only commit resources with $SUT+MUT \leq 270$
 - Proposed revisions not necessary given rare scenario that seams issues would necessitate needing to revise bids

CAISO response on revised proposal to clarify how “locking” commitment costs should be applied to exceptional dispatches

- In response to stakeholder requests to clarify how the re-bidding rules interacts with exceptional dispatches
- Revised proposal to include settlement rules that would settle exceptional dispatches at commitment cost bids considered in initial instruction for the instruction period
- Analogous logic to not allowing revised bids through minimum run time since the market cannot reconsider these costs given the inter-temporal constraint
- Once exceptionally dispatched the economics of the resource are not able to impact the dispatch point through the exceptional dispatch instruction period

Stakeholder comments on revised straw proposal to apply settlement rules when no offer present

- CAISO's revised straw proposal included settling resources' dispatched at Pmin to respect inter-temporal constraint where it did not have a minimum load offer at minimum load cost reference level
- Six Cities, NV Energy, and WPTF support use of proxy costs instead of treating as self-commitment period and no other stakeholders opposed the proposed change
 - Support settling at cost estimate if market is not capable of not committing resources that lack bids to supports resource's registered inter-temporal constraints
 - NV Energy and WPTF maintain market should interpret no bid for an hour as the supplier does not wish to participate within market and believe optimization should be enhanced to fully implement these changes at later date

CAISO response on revised straw proposal to apply settlement rules when no offer present

- In light of broad stakeholder support the CAISO did not make any changes to its revised straw proposal
- On request to incorporate design principle in optimization that interprets hours without bids as those where supplier should not be considered available:
 - Optimization changes should be considered under potential future refinements
 - CAISO requests stakeholder submit a request to include the item in the stakeholder catalogue

Stakeholders requested additional points of clarification

- How does Min Down Time interact with rebidding rules?
 - Minimum down time is not included in the real-time rebidding logic because it is not necessary since the re-bidding window is locked once a commitment is issued.
- How does the rebidding rules account for IFM non-spin awards?
 - No explicit rule that if non-spin awards without energy awards are issued from the integrated forward market that these resources would be locked to those cost levels
 - CAISO not concerned because for the most part when issuing a non-spin award for non-fast start units the CAISO regularly also issues an energy award, which does result in locking the resources' bids to those used in the integrated forward market

Section 8.2 - Proposals to support negotiated commitment cost reference levels and supplier submitted adjustments to energy and commitment cost reference levels

Stakeholder comments on revised straw proposal to use aggregated market price distribution to verify adjustment

- CAISO's revised straw proposal included detailed guidelines for the verification of the adjustment requests
- CAISO proposed off-ICE quotes can be included in the aggregated market price distribution if supplier performed good faith effort to sample off-ICE market
- Aggregated market price information controlled for outliers establishes metric to screen for artificial price information
- Liquidity requirement is used to determine whether the aggregated market price distribution can include off-ICE quotes
 - Supplier must collect between 5-10 quotes where none are from affiliated entities

Stakeholder comments on revised straw proposal to use aggregated market price distribution to verify adjustment

- Six Cities, NRG, and NV Energy generally support the use of the aggregate market price distribution metric with caveat that the liquidity requirement for including off-ICE quotes appears too restrictive
 - NV Energy suggests **2-3 quotes**
 - NV Energy, NRG, and Six Cities support flexibility to show good faith effort to collect off-ICE quotes was done
- DMM and SCE appear to generally oppose the use of the aggregate market price distribution metric including the liquidity requirement
 - SCE states that being able to garner any price quotes at all would not be indicative of liquidity and urges use of average of sample
 - DMM recommends a more general approach allowing judgement

CAISO response on revised straw proposal to use aggregated market price distribution to verify adjustment

- CAISO proposes to maintain proposal to use aggregated market price distribution metric for verification purposes
 - CAISO confident that this is a reasonable metric for bona fide information without being overly restrictive and makes no changes
 - CAISO understands there may be confusion the metric is to produce a price benchmark and seeks to clarify it is not for that purpose but instead to establish verification metric to screen for artificial price information
 - CAISO believes establishing transparent metric aids both suppliers' and CAISO's ability to implement new process
- CAISO proposes to relax the liquidity requirement to 2-3 quotes
- CAISO revised its proposal to clarify eligible quotes include:
 - Instances in which supplier solicited offers but were not able to obtain one
 - Quotes obtained by phone supported by contemporaneous documentation of the phone call but need not be recorded

Stakeholder comments and CAISO response on proposal to seek additional audit authority

- CAISO's revised straw proposal to include proposal that would allow CAISO to seek additional audit authority to monitor for suppliers who submit inaccurate fuel price or fuel type that was biased in the favor of the supplier (i.e. artificial price information)
- NV Energy and WPTF were generally supportive of the additional audit authority and no other stakeholders opposed revision
- After further review, CAISO determined it does not need to seek additional audit authority as it has sufficient authority under its existing tariff to seek additional information supporting supplier followed rules for adjustment requests regardless of whether verified ex ante through automated screen
- CAISO revised proposal to remove proposal to seek additional authority and revised its timeline for the ex post verification phase to no longer than T+55 after the trade date.

Stakeholders requested additional points of clarification

- NV Energy requested whether its possible to update to different trading hub values
 - Yes as explored in earlier versions as well as the draft final proposal in section 8.2.3.1 with the ex ante reference level adjustment request as the tool to do so
- NRG requested clarification that all commitment cost bid components in App C are eligible for negotiation
 - CAISO clarified in Appendix B, “CAISO can clarify that at a minimum, the negotiation would include the cost components included in the CAISO’s existing proxy commitment cost estimates” where existing proxy commitment cost estimates would include all components discussed in Appendix C.1-C.4.
- Stakeholders requested clarification on what the high side of the aggregated market distribution is or reasonable prevailing prices
 - CAISO explains the “high” in Appendix C.4 and is the lower of the highest offer in the aggregated market price distribution or the lower fence for outliers

Section 8.3 - Proposals to support market-based commitment costs subject to mitigation

Stakeholder comments on revised straw proposal to cap market-based commitment cost components at 300% of commitment cost reference levels

- PGE and WPTF support increased cap but fear 300% may be too low to capture price risk especially for areas outside of California delivery locations
- Six Cities and SDG&E support increased cap once mitigation is implemented but requests initially increasing to 200%
 - Six Cities: “Up to 200% of proxy costs would be more appropriate”
 - SDGE: Use of this value from the far more volatile Eastern markets is inappropriate and suggests setting initial value at much lower level that can be incremented up over time as experience is gained
- SCE opposes proposed 300% cap and states in Table 3, Page 24 of Revised Proposal only 6 of 21 instances use 300% in conduct test so does not find supportable that this is a conservative value

CAISO's response on revised straw proposal to cap market-based commitment cost components at 300% of commitment cost reference levels

- CAISO revised its proposal to:
 - Initially apply a market-based offer cap at 200%
 - To have flexibility to increment the cap up over time as experience is gained and if market efficiency benefits are demonstrated
 - CAISO would initiate stakeholder process to consider increases
- CAISO believes SCE and SDGE's interpretation of Table 4: Conduct and Impact Thresholds appears to be based on misunderstanding and clarifies that conduct thresholds:
 - Should not be interpreted as similar to “circuit breaker caps” these are cost based thresholds not market based thresholds
 - Conduct thresholds establish level above which might not be reasonable reflections of cost expectations → cost based caps

CAISO sought stakeholder feedback on revised straw proposal for commitment cost mitigation test

Mitigation Design Feature	IFM	STUC	HASP	RTM Pre-Dispatch/FMM
Requires new LMPM process (all constraints run and post-processing)	N	Y	N	N
Type of constraint tested	Critical (85% Flow)			
Identifying potentially pivotal suppliers	Includes net buyers and sellers			
RSI calculation – allows commitment/de-commitments	Y, impacts WC and SPCF ^{PPS}			
RSI calculation – basis for maximum capacity that could be withheld from pivotal suppliers	Max effective available capacity	Max effective available capacity (ramp constrained)		
Mitigation Criterion	Net effect of commitment on congestion system-wide			

Note: Items in red reflect changes from straw proposal

CAISO sought stakeholder feedback on potential changes to the revised straw proposal on August 11

Mitigation Design Feature	IFM	STUC	HASP	RTM Pre-Dispatch/FMM
Requires new LMPM process (all constraints run and post-processing)	N	Y	N	N
Identifying potentially pivotal suppliers	Includes net buyers and sellers			
Type of constraint tested	Critical (85% Flow) Change to binding plus additional constraints identified by CAISO as likely needing commitments to resolve a constraint			
RSI calculation – allows commitment/de-commitments	Y, impacts WC and SPCF ^{PPS}			
RSI calculation – basis for maximum capacity that could be withheld from pivotal suppliers	Max effective available capacity	Max effective available capacity (ramp constrained)		
RSI calculation – demand for counterflow should include available counterflow not dispatched up to unloaded capacity	Only for non-binding constraints include in the denominator of the RSI calculation the lower of effective capacity not dispatched in AC run or unloaded capacity (Limit-AC flow)			
Mitigation Criterion	Net effect of commitment on congestion system-wide (replace with default shadow price if not binding)			

Note: Items in red reflect proposed changes from revised straw proposal

Stakeholder comments on planned change to revised straw proposal for greater flexibility to select non-binding constraints for testing

- CAISO revised its proposal to propose that its commitment cost mitigation would test all binding constraints and a selection of non-binding constraints identified as likely needing commitments to resolve a binding constraint
- SCE and PGE supports greater flexibility
- SDG&E and NRG did not directly oppose greater flexibility but appear to prefer the using the proxy of critical constraints
 - NRG testing non-binding will result in unwarranted mitigation and suggests even if constraint identified in advance that the need to apply the dynamic test should still be conditioned on flow level
- WPTF opposes not selecting a method for determining constraints as its less transparent and understandable

CAISO's response on planned change to revised straw proposal for greater flexibility to select non-binding constraints for testing

- CAISO believes it is prudent for it to seek greater flexibility to identify constraints in addition to critical constraints for a commitment cost test as:
 - The constraints likely needed commitments to resolve the constraint will largely be structural in nature
 - This flexibility is similar to that used by PJM – the organized market that mitigates commitment cost components based on a three pivotal supplier test
- CAISO believes this approach would be as transparent as pursuing one direction since it would provide transparency to the market including the study results leading to that designation
 - Level of transparency would be analogous to the information provided in the past when CAISO performed static structural test

CAISO's response on planned change to revised straw proposal for greater flexibility to select non-binding constraints for testing cont.

- Perform seasonal static competitive path assessments
 - Propose to follow similar methodology to that employed when CAISO performed static assessment prior to 2012
 - Propose to release seasonal assessments describing methodology and identifying constraints
- Constraints identified in the “non-competitive” set based on this static structural test will always be tested regardless of whether the AC run identifies it was binding or not
- If CAISO identifies system dynamics changed significantly after the static assessment for the applicable period was performed, the CAISO will re-run the static assessment given revised expectations of system conditions and release an updated assessment prior to market run
- DCPA for commitment cost will be performed on all binding constraints and any “non-competitive” constraints from static assessment

Stakeholder comments and CAISO response on revised straw proposal to assess net buyers and net sellers

- CAISO's revised straw proposal included assessment of both net buyers and net sellers in determining the potentially pivotal suppliers
- NRG and DMM support this revision
- In light of stakeholder support the CAISO did not make any changes to its revised straw proposal

Stakeholder comments on planned change to revised straw proposal to establish default shadow prices for non-binding constraints

- CAISO presented a planned revision to its revised straw proposal that would:
 - Substitute a default shadow price if non-binding to estimate sensitivity of objective function to that constraint
 - Calculate non-competitive congestion component with actual or default shadow prices for binding and non-binding respectively
- WPTF and SCE support as directionally appropriate
- DMM opposes

CAISO's response on planned change to revised straw proposal to establish default shadow prices for non-binding constraints

- CAISO determined default shadow price is inferior to unity factor:
 - Using historical information in a test designed to test for current competitive conditions undermines the inherent design of the test
 - SMEC is not a good reference since it does not reflect the objective function solution that the shadow price is relative to nor would it be accurate for use in EIM areas
 - CAISO believes magnitude of shadow price is less relevant to commitment cost mitigation since have no direct price impact
 - Treating at unity is a robust design approach not undermined by need to make large assumptions
- CAISO did not include this planned change in its draft final proposal but instead maintained the revised straw proposal to calculate net effect of commitments at resource's location

CAISO's response on planned change to revised straw proposal to establish default shadow prices for non-binding constraints cont.

- CAISO believes that there should not be a shadow price contribution to the net effect for identifying commitments needing mitigation
- Eastern markets approach tests for incentive to exercise market power (incentive to withhold capacity) – shift factor to constraints
 - Test each constraint and if supplier can relieve congestion on any non-competitive constraint mitigates
- CAISO's energy test is less conservative from a suppliers perspective by:
 - (1) testing for incentive to exercise market power based on shift factors system-wide
 - (2) identifying ability to impact price based on shadow price
- Commitment costs do not directly impact price therefore the second criteria is not needed for identifying commitments
- CAISO believes allowing for the net effect rather than constraint-by-constraint approach for testing for incentive to exercise market power is robust approach

Stakeholder comments and CAISO's response on planned change to revised straw proposal to modify residual supply index denominator

- WPTF opposes planned change since it results in over-mitigation and is not a good proxy for demand for counterflow that might have been observed prior to committing resource(s)
- CAISO understands that DMM also opposes planned change
- CAISO did not include this planned change in its draft final proposal but instead maintained the revised straw proposal where no changes to the denominator were proposed

Stakeholder comments and CAISO's response on revised straw proposal to mitigate energy component using energy test and commitment cost components using commitment cost test

- PGE, NRG, and WPTF support mitigating separately
- NV Energy is neutral
- CAISO revised its proposal to reflect this change given stakeholder support for this direction where the draft final proposal applies the separate mitigation tests to their applicable component(s)

Stakeholder comments and CAISO's response on revised straw proposal for applying logic for removing floor on dispatchable downward capacity

- WPTF suggested the CAISO revise its conditional logic to consider minimum run time in addition to whether its ramp capable movement would allow for de-commitment
 - Capacity below minimum load should only be considered if resource has already met its minimum run time so that market would be able to de-commit resource
- CAISO revised its proposal to include this conditional logic as it agrees that including minimum up time is an improvement to the design

CAISO's response on revised straw proposal for applying logic for removing floor on dispatchable downward capacity

CAISO revised proposal to calculate $WC_{l,j}^{CCM}$ in RTUC:

$$\begin{aligned} & WC_{l,j}^{CCM} \\ &= \sum_{i=1}^n [SF_{l,i} \\ & * (\min(DOP_{i,t-1} + RR_i * 15, ENGYMAX_i)) \end{aligned}$$

CAISO's response on revised straw proposal for applying logic for removing floor on dispatchable downward capacity

CAISO revised proposal to calculate $SPCF_{l,j,i}^{PPSCCM}$ in RTUC:

$$SPCF_{l,j,i}^{PPSCCM} = SF_{l,i} * \delta \max(DOP_{i,t-1} - RR_i * 15, ENGYMIN_i)$$

Where $\delta = \{0,1\}$

$$DOP_{i,t-1} - RR_i * 15 \leq ENGYMIN_i \rightarrow \delta = 0$$

$$DOP_{i,t-1} - RR_i * 15 > ENGYMIN_i \rightarrow \delta = 1$$

δ is locked to 1 for:

- Must-run resources (i.e. self-schedules or AS awards),
- Resources that have not fulfilled minimum run time (i.e. min up time)

Stakeholder comments and CAISO's response on revised straw proposal for including minimum load energy if feasible start-up

- SCE submitted comments in support of including acknowledgement that if feasible to start based on its start up ramp time that the unit should be considered
- CAISO understands there is need to clarify that allowing minimum load energy if feasible start-up has been a constant component of the proposal
- Based on stakeholder feedback and further review of tariff language, CAISO revised its proposal to explicitly propose to amend its tariff to allow consideration of minimum load energy in the assessment of competitive path designation if a resource can start up within the optimization time horizon

Stakeholder comments and CAISO's response on interaction between *Contingency Modelling Enhancements* and the new commitment cost mitigation test

- Under the proposal to allow market-based offers for commitment costs subject to mitigation, CAISO proposes that this new mitigation test would be applied to corrective capacity constraints by integrating the two proposed policy changes
 - CME changes LMPM to account for 20m corrective capacity
 - CCDEBE changes to account for potential market power concerns with commitments.
- CME corrective capacity constraints will be effective at eliminating the majority of the need to enforce minimum online constraints – expectation for only limited use for reactive power or voltage concerns

Stakeholders requested additional points of clarification

- SCE mentions withheld capacity should change hourly
 - CAISO clarifies that these components are calculated for every interval in the unit commitment time horizon and can change
 - CAISO's proposal has always been to test by interval used in unit commitment i.e. DAM – hourly, RTM – 15 minute intervals and testing all intervals regardless of whether advisory or binding
- SCE raises that it may not be appropriate to use 15 min ramp rate time period for purposes of mitigating starts
 - CAISO clarifies that feasible starts are not assessed in the DCPA using ramp rate * number of minutes in interval (15 min) but instead based on whether resource is able to start-up in the unit commitment decision then the minimum load energy is considered
 - CAISO added language clarifying its proposal allows feasible starts based on unit commitment horizon.

Stakeholder comments on revised straw proposal to deem resources within minimum online constraints uncompetitive

- CAISO presented planned change to revised straw proposal on August 11 call where if resource is identified within a set of resources under a minimum online constraint (MOC) → mitigate commitment cost components to commitment cost reference level for each component
- WPTF conditionally supports proposal contingent on *Contingency Modelling Enhancements* implementation, which will reduce number of MOCs enforced in market
- NRG neither supports or opposes but questions assumption:
 - Appreciates CME efforts to eliminate MOCs
 - Request CAISO provide addtl. Information to support assertion that resources within MOCs are uncompetitive

CAISO's response on revised straw proposal to deem resources within minimum online constraints uncompetitive

- Mitigate to cost based offers resources within minimum online constraints for local issues
 - Typically be enforced for reactive power or voltage requirements
- Clarifies considered “uncompetitive” by definition because they are for reactive power or voltage requirements that are:
 - Local issues by nature
 - Would likely include very few resources under the constraint

STAKEHOLDERS REQUESTED CLARIFICATION ON REVISIONS TO PROXY COSTS UNDER PROPOSAL

Overview

- Under proposal, CAISO refers to combination of 3 commitment proxy costs as “commitment cost reference levels” or “mitigated proxy costs” for simplicity
- CAISO clarifies that in practice CAISO will continue to refer to its commitment cost reference levels as commitment proxy costs and energy cost reference levels as default energy bids
 - 2 options for proxy costs to include negotiated or estimated
 - 3 options for default energy bids (existing policy/no changes)
- CAISO clarifies that the ex ante submitted reference level adjustments are requests to adjust reference levels regardless of option selected to value more reflective of suppliers’ cost expectations resulting in either:
 - Unadjusted reference levels (based on one of the options above)
 - Adjusted reference levels

Stakeholders requested clarification in which processes the “new” commitment cost reference levels will be used

- Used in bid validations:
 - As benchmark for market-based commitment cost cap at 200%
 - As benchmark for cost-based reasonableness threshold limit where reasonableness threshold is resource-specific percentage times the resource’s commitment cost reference level
- Used in market and settlements when mitigation applies
 - As mitigated cost level when mitigation criterion is met
- Used in settlements when “no bid” process needed
 - As reference level to settle a resource at when the “no bid” process is needed due to dispatch resource consistent with inter-temporal constraint where no minimum load bid is present

Minimum load reference level (unadjusted) follows Appendix C.1.2 formulation without Pmin re-rate

Commitment cost reference level calculation in Appendix C.1.2 used for bid validation, market when mitigation applies, and settlements for “no bid” process

$$\text{Minimum Load Cost} = \begin{cases} (\text{Minimum Load Fuel Cost} + \text{VOM} + \text{GMC Adder}) * \text{Scalar}, & \text{GHG}_{\text{Flag}} = 'N' \text{ and } \text{MMA} = 0 \text{ and } \text{OC} = 0 \\ (\text{Minimum Load Fuel Cost} + \text{VOM} + \text{GMC Adder} + \text{GHG Cost}) * \text{Scalar}, & \text{GHG}_{\text{Flag}} = 'Y' \text{ and } \text{MMA} = 0 \text{ and } \text{OC} = 0 \\ (\text{Minimum Load Fuel Cost} + \text{VOM} + \text{GMC Adder} + \text{GHG Cost} + \text{MMA}) * \text{Scalar}, & \text{GHG}_{\text{Flag}} = 'Y' \text{ and } \text{MMA} \neq 0 \text{ and } \text{OC} = 0 \\ (\text{Minimum Load Fuel Cost} + \text{VOM} + \text{GMC Adder} + \text{GHG Cost} + \text{MMA}) * \text{Scalar} + \text{OC Adder}, & \text{GHG}_{\text{Flag}} = 'Y' \text{ and } \text{MMA} \neq 0 \text{ and } \text{OC} \neq 0 \end{cases}$$

- For gas resources: Minimum Load Fuel Cost = Unit Conversion * Heat_Rate * Pmin * GPI_{DA,RT}, where Heat_Rate and Pmin are registered fields in Master File
- For non-gas resources: Minimum Load Fuel Cost = (Unit Conversion * HEAT_{AVG_COST_POINT1,PMIN} * Pmin + MIN_LOAD_COST), where HEAT_AVG_COST, Pmin, and MIN_LOAD_COST are registered fields in Master File
- $\text{GHG Cost} = \text{Unit Conversion} * \text{Heat_Rate} * \text{Pmin} * \text{Emissions Rate} * \text{GHG Allowance Rate}$
- Unit conversion = 0.001
- $\text{VOM} = \text{VOM} * \text{Pmin}$
- $\text{GMC Adder} = \text{Pmin} * \text{GMC}$
- MMA = ISO determined major maintenance adder
- Scalar=1.10
- OC Adder = ISO determined opportunity cost adder for resources with eligible run hour limitations (calc/negotiated)

Minimum load reference level (unadjusted) follows Appendix C.1.2 formulation with Pmin re-rate

- Commitment cost reference level calculation in Appendix C.1.2 must use estimates based on re-rated Pmin for bid validation (establish benchmark to compare 200% & reasonableness thresholds against)
- Depending on ease of implementation can be achieved by either:
 - Enhancing bidding system to perform DEB integration prior to validating

$$MLC' = MLC + \int_{P_{min}}^{P_{min'}} DEB(p) dp$$

MLC'

Minimum load cost reference level at the re-rated Pmin level

MLC

Minimum load cost of the **minimum load cost reference level (Appendix C.1.2)**

$DEB(p)$

Default energy bid cost associated with the actual cost of re-rating a resource or MSG configuration's Pmin

dp

Change in energy

- Adding requirement that ex ante reference level request be submitted based on a minimum load re-rate (if required BPM will include scenario)

Minimum load reference level (unadjusted) follows Appendix C.1.2 formulation with Pmin re-rate cont.

- Commitment cost reference level calculation in Appendix C.1.2 must use estimates based on re-rated Pmin in market and settlements when mitigation applies or settlements identifies “no bid”
- CAISO systems apply the default energy bid integration method when setting mitigated cost levels as follows:

$$MLC' = MLC + \int_{P_{min}}^{P_{min'}} DEB(p) dp$$

MLC'

Minimum load cost reference level at the re-rated Pmin level

MLC

Minimum load cost of the **minimum load cost reference level (Appendix C.1.2)**

$DEB(p)$

Default energy bid cost associated with the actual cost of re-rating a resource or MSG configuration's Pmin

dp

Change in energy

Start-up cost reference level (unadjusted) follows Appendix C.1.2 formulation with Pmin re-rate cont.

Commitment cost reference level calculation in Appendix C.1.3 used for bid validation, market when mitigation applies, and settlements for “no bid” process

$$\text{Start-up Cost} = \begin{cases} (Start - up Cost + Start - up Energy Cost + GMC Adder) * Scalar, \\ \quad GHG_{Flag} = ' N ' \text{ and } MMA = 0 \\ (Start - up Cost + Start - up Energy Cost + GMC Adder + GHG Cost) * Scalar, \\ \quad GHG_{Flag} = ' Y ' \text{ and } MMA = 0 \\ (Start - up Cost + Start - up Energy Cost + GMC Adder + GHG Cost + MMA) * Scalar, \\ \quad GHG_{Flag} = ' Y ' \text{ and } MMA \neq 0 \\ (Start - up Cost + Start - up Energy Cost + GMC Adder + GHG Cost + MMA) * Scalar + OC Adder, \\ \quad GHG_{Flag} = ' Y ' \text{ and } MMA \neq 0 \text{ and } OC \neq 0 \end{cases}$$

Where:

- If gas resource, then:
- $Start - up Fuel Cost = STRT_{STARTUP_{FUEL}} * GPI_{DA,RT}$, where $STRT_{STARTUP_{FUEL}}$ is registered field in Master File
- else if non-gas, then:
- $Start - up Fuel Cost = STRT_{STARTUP_{COST}}$, where $STRT_{STARTUP_{COST}}$ is registered field in Master File
- $Start - up Energy Cost = STRT_{STARTUP_{AUX}} * EPI$, where $STRT_{STARTUP_{AUX}}$ is registered field in Master File
- $GMC Adder = Pmin (TARTUP_{RAMP_TIME}/60min) * \frac{GMC}{2}$, where $STARTUP_{RAMP_TIME}$ is registered field in Master File
- $GHG Cost = STRT_{STARTUP_{FUEL}} * \text{Emissions Rate} * GHG \text{ Allowance Rate}$ where $STRT_{STARTUP_{FUEL}}$ is registered field in Master File
- MMA = ISO determined major maintenance adder
- Scalar=1.1
- OC Adder = ISO determined opportunity cost adder for resources with eligible start limitations (calc/negotiated)

Transition cost reference level (unadjusted) follows Appendix C.1.4 formulation

Commitment cost reference level calculation in Appendix C.1.4 used for bid validation, market when mitigation applies, and settlements for “no bid” process

$$\begin{aligned} & \textit{Transition Cost Reference Level} \\ = & \begin{cases} (\textit{Proxy Start Up Costs}_{ToConfig} - \textit{Proxy Start Up Costs}_{FromConfig}) * \textit{Scalar}, & OC = 0 \\ (\textit{Proxy Start Up Costs}_{ToConfig} - \textit{Proxy Start Up Costs}_{FromConfig}) * \textit{Scalar} + \textit{OC Adder}, & OC \neq 0 \end{cases} \end{aligned}$$

- $\textit{Proxy Start Up Costs}_{ToConfig}$ = Calculated proxy start up costs of the “To Configuration” the resource is transitioning to
- $\textit{Proxy Start Up Costs}_{FromConfig}$ = Calculated proxy start up costs of the “From Configuration” the resource is transitioning from
- $\textit{Scalar} = 1.10$
- $\textit{OC Adder}$ = ISO determined opportunity cost adder for resources with eligible start limitations (calc/negotiated)

Ex ante submitted reference level adjustments could result in adjusted reference level if verifiable

- Supplier must note which component(s) they are requesting adjustment(s) for and follow guidelines in Appendix C
 - Must use calculations found in Appendix C.1 allowing for updates to input values to better reflect suppliers' cost expectations
 - Must meet criteria described in Appendix C.2, C.3, and C.4
- If verified prior to market run then market replaces unadjusted reference level with verified value
- If unverified prior to market run then market will use unadjusted reference level and evaluate request after-the-fact in ex post verification phase
- If verified after-the-fact then CAISO will re-settle suppliers' invoice with verified value
- If CAISO identifies in ex post verification phase that **any** adjustment request did not follow guidelines then CAISO will re-settle suppliers' invoice with the unadjusted reference level

NEXT STEPS

Plan for stakeholder engagement

Milestone	Date
Issue paper posted	November 18, 2016
Stakeholder call	November 22, 2016
Stakeholder written comments due	December 9, 2016
Straw Proposal Posted	June 30, 2017
Stakeholder meeting	July 6, 2017
Stakeholder written comments due	July 20, 2017
Revised straw proposal	August 1, 2017
Stakeholder meeting	August 3, 2017
Stakeholder written comments due	August 10, 2017
Draft final proposal posted	August 18, 2017
Stakeholder call	August 30, 2017
Stakeholder written comments due	September 11, 2017
EIM governing body meeting	October 10, 2017
Board of Governors meeting	November 1-2, 2017

