Commitment cost and default energy bid enhancements discussion

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Topics

- Enhancing market power mitigation to identify uncompetitive conditions where commitment is likely needed to resolve constraint
- Enhancing exceptional dispatch mitigation in real-time to capture market power mitigation enhancements
- Expanding existing measures addressing inter-temporal concerns
- Dynamics of market power mitigation in the energy imbalance market

Summary of proposal - Enhancing market power mitigation to identify uncompetitive conditions where commitment is likely needed to resolve constraint

- Energy bids are mitigated based on LMP decomposition
- If a resource's energy bid is mitigated, commitment costs will also be mitigated
- If a resource's energy bid is not mitigated it may have incentive to exercise market power to inflate uplift and additional mitigation to commitment costs is needed
  - Mitigate additional resources' commitment costs based on their effectiveness to relieving binding non-competitive constraints (includes committed or uncommitted resources)
  - Mitigate additional resources' commitment costs based on whether their effective counterflow exceeds the unloaded capacity of non-binding non-competitive constraints (includes only committed resources)

Binding transmission or corrective capacity constraints mitigation

- Enhance RSI calculated on binding constraints to account for ability to shutdown
  - Applies conditional logic if it can ramp to Pmin in interval based on ramping from initial condition to the interval within horizon
  - Impacts real-time calculations for:
    - Withheld capacity (WC)
    - Supply of counterflow from potentially pivotal suppliers (SCF^{PPS})
- Test for resource advantage using LMP decomposition
- If resource fails LMP decomposition in an interval ➔ mitigate energy and commitment costs under current rules

Mitigating **additional** resources effective to **binding & non-binding** transmission or corrective capacity constraints

- Perform second RSI calculation on all critical constraints
- No longer default net buyers to fringe competitive suppliers
- Apply enhancement to allow for ability to shutdown
- Add enhancement to determine ramp capable movement in real-time relative to initial condition not the prior interval's DOP
- Subtract unloaded capacity from demand for counterflow

Continued: Mitigating **additional** resources effective to **binding & non-binding** transmission or corrective capacity constraints

- Test for resource advantage using non-competitive commitment mitigation criterion
  - Flag interval if shift factor is negative so effective counterflow is provided on binding non-competitive constraint (Sf_i<0)
  - Flag interval if effective dispatch exceeds unloaded capacity where DOP_i^{NC}>0 for non-binding non-competitive

$$DOP_i^{NC} = DOP_i * -SF_i - (Limit_{l,ckc} - Flow_{l,ckc})$$

  - Apply mitigation if any interval fails with a positive DOP_i^{NC}
    - Minimum load mitigated in every interval of the impact window
      - Impact window is range of intervals tested (i-MUT and i+MUT)
    - Start-up/transition mitigated for entire horizon if any interval fails

Mitigating **additional** resources effective to **binding & non-binding** minimum online constraints

- Perform competitive path assessment on critical MOCs where if $S_m^{FCS} < MOC_m$ then deemed uncompetitive
- Do not default net buyers to fringe competitive suppliers
- Maximum potentially withheld capacity is upper operating limit (same formula day-ahead and real-time)
  - Withheld capacity for given portfolio is sum of all resources effective capacity to MOC and top 3 WC will be pivotal suppliers

$$WC_{m,j} = \sum_{i=1}^{n} COEFF_{m,i} * ENGYMAX_i$$

  - Supply from pivotal suppliers is 0 ($S_m^{PPS} = 0$)
  - Supply from fringe competitive suppliers is sum of all resources under fringe suppliers effective to MOC

$$S_m^{FCS} = \sum_{i=1}^{n} COEFF_{m,i} * ENGYMAX_i$$

Continued: Mitigating **additional** resources effective to **binding & non-binding** minimum online constraints

- Test for resource advantage using non-competitive commitment for MOCs criterion
  - Perform resource test in every interval
  - Flag interval if capacity under MOC is needed ($UOL_i^{NC} > 0$)
- Resource test calculates effective capacity under MOC and compares whether MOC without resource

$$UOL_i^{NC} = MOC_m - \sum_{i=1}^{n} COEFF_{m,i} * ENGYMAX_i$$

  - Set of resources (i) contains all resources under MOC
  - MOC_m is the minimum online requirement for the MOC
- Apply mitigation if interval within window or horizon fails

Summary of proposal - Enhancing exceptional dispatch mitigation in real-time to capture market power enhancements

- Include results of second residual supply index in default competitive path assessment used for exceptional dispatch mitigation
- Add second static list for after-the-fact mitigation that identifies non-competitive paths based on historical DCPA results of critical constraint testing
- Apply mitigation to commitment costs of exceptional dispatch in real-time if effective to an uncompetitive path on either the binding-only or the critical static list
- Mitigate commitment costs for incremental and decremental instructions to higher of or lower of reference level or bid (mitigated/unmitigated) respectively

Continued: Discussion on use of default list in mitigation

- Default competitive path assessment used for mitigating exceptional dispatches and as fallback if dynamic fails
- Current default list identifies non-competitive paths using historical DCPA results and mitigates energy bids if exceptional dispatch is effective to relieving constraints
- Applied to exceptional dispatches for:
  - System emergency conditions
  - Market disruption
  - Mitigate overgeneration conditions
  - Prevent or relieve an imminent system emergency, including forced start-ups and shut-downs
  - Modelling limitations

Proposal to apply results of market power mitigation on commitment costs for exceptional dispatches

- Propose to maintain 2 static lists
  - Current list identifies non-competitive paths if path was **binding** in 10 or more hours and deemed uncompetitive more than 25% of the time
  - New list will be added that identifies non-competitive paths if path was **critical** in 10 or more hours and deemed uncompetitive more than 25% of the time
- Propose to apply mitigation to exceptional dispatches based on these lists as follows:
  - Energy component mitigated if effective to current list
  - Commitment cost component mitigated if effective to new list

Continued: Proposal to apply results of market power mitigation on commitment costs for exceptional dispatches

- Mitigate energy consistent with current rules
- Mitigate commitment cost components for entire instruction period if applicable and effective to constraint
  - Mitigate incremental exceptional dispatches by:
    - Mitigate min load to higher of revenues for min load energy, minimum load reference level, or minimum load bid
    - Mitigate start-up and transition to higher of start-up and transition cost reference levels or start-up or transition cost bids
  - Mitigate decremental exceptional dispatches by:
    - Mitigate min load to lower of revenues for min load energy, minimum load reference level, or minimum load bid
    - Mitigate start-up and transition to lower of start-up and transition cost reference levels or start-up or transition cost bids

Summary of proposal - Expanding existing measures addressing inter-temporal concerns

- Concerns with vulnerability of ability to exercise inter-temporal market power was addressed in *Bidding Rules Enhancements and Aliso Canyon Phase 1* with the design of the real-time re-bidding rules
  - Real-time re-bidding rules locks the re-bidding window was committed in real-time through min run time
- Enhancing rules for exceptional dispatch settlement to lock the bid at the bid used when the instruction was issued by the Operator through the instruction period
- Enhancing rules to use bid at the time resource is being dispatched downward in full ramp

Addressed inter-temporal concerns in bidding rules enhancements

- Allow resources to rebid start up, transition, and minimum load costs in real-time if did not receive IFM award or binding RUC start-up instruction
- Allow resources to rebid until receiving a binding RTM start-up instruction
- SIBR locks the re-bidding window (does not accept submitted bids) through the resources' minimum run time
- No changes to rules needed for market commitments
- ISO proposes changes to settlement rules for exceptional dispatches and commitments costs during full ramp to mitigate incentives for market power

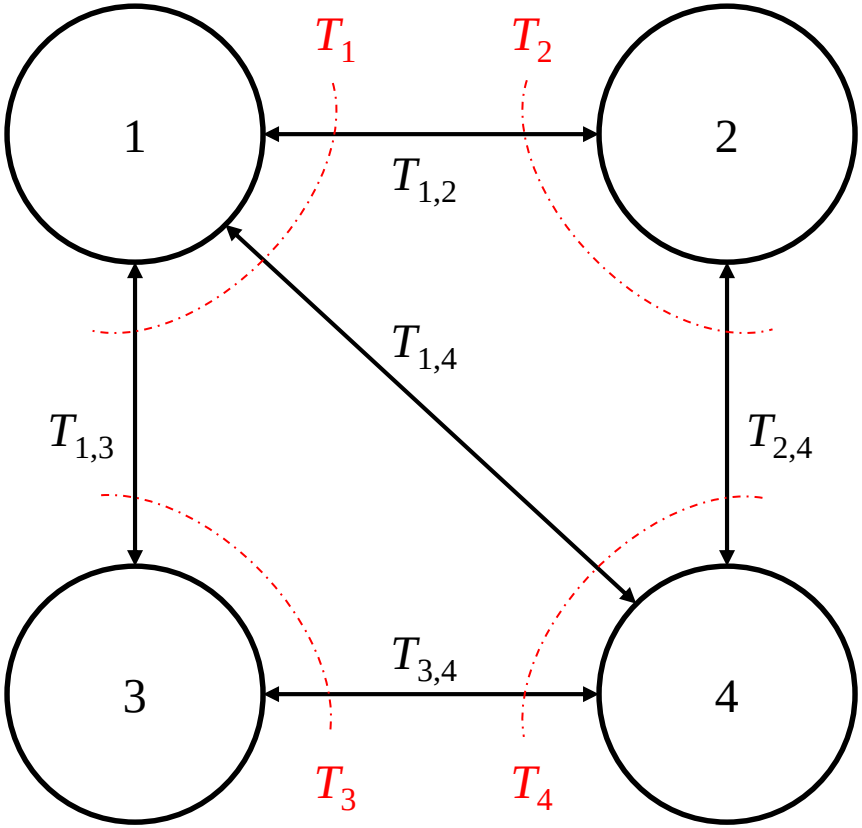
Additional measures addressing inter-temporal concerns

- Propose to include settlement rules that would settle exceptional dispatches at commitment cost bids considered in initial instruction for the instruction period
  - Bid price can be either a mitigated or unmitigated bid
- 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

Continued: Additional measures addressing inter-temporal concerns

- Propose commitment costs should be settled at commitment cost bids from the interval from which the resource is being dispatched down at full ramp
  - Bid price can be either a mitigated or unmitigated bid
- Applies to intervals where resource is in downward ramp

EIM Optimization Model



$$\min\left(\sum_i C_i\, G_i\right)$$

$$\sum_{i \in BAA_j} (G_i - L_i) - Loss_j = T_j, \forall j$$

$$\sum_j T_j = 0$$

$$T_j = \sum_{j \neq k} T_{j,k}\,, \forall j$$

$$\underline{T_{j,k}} \leq T_{j,k} = -T_{k,j} \leq \overline{T_{j,k}}, \forall j \neq k$$

EIM BAA Market Power Mitigation

- Transform the problem eliminating CISO PBC

$$T_1 = -\sum_{j>1} T_j \Rightarrow \sum_i (G_i - L_i) - Loss = 0$$

  - CISO is the reference for marginal energy price
    - The shadow price of the system PBC
  - CISO is considered a competitive BAA
  - Marginal energy prices for EIM BAAs separate from CISO by the shadow price of their PBC
    - Positive shadow price: import congestion
    - Negative shadow price: export congestion

- DCPA and MPM for import transfer congestion