# Convergence Bidding Design under MRTU

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## Background for Presentation

- FERC ordered the ISO to implement convergence or virtual bidding within twelve months after start of MRTU
- ISO's convergence bidding proposal is going to Board for approval at October 2009 its meeting
- MSC has been asked to prepare an opinion of ISO proposal
- This presentations summarizes MSC's current thinking on ISO proposal
  - Legal note—Presentation is not a formal MSC opinion
- Stimulate stakeholder comment on ISO proposal and our current thinking on issue

## Goals of Convergence Bidding (CB)

- Limit deviations between day-ahead (DA) and real-time (RT) prices
- If expected value of P(RT) equals P(DA) and difference is not predictable using publicly available information
  - Suppliers will schedule and bid generation units in least cost manner because they expect to receive same price from DA and RT markets
  - Reduce variance in (P(DA) – P(RT))
- Limit ability of market participants to move market prices through their unilateral actions
  - Many convergence DEC and INC bids around market-clearing price makes it more difficult for any individual bidder to move prices



## Goals of Convergence Bidding (CB)

- Limit deviations between day-ahead and real-time congestion charges
- If expected value of P(RT,A) – P(RT,B) equals P(DA,A) – P(DA,B)
  - Suppliers and loads will schedule and bid in least cost manner because they expect to bear same congestion charge in DA and RT markets
  - Reduce variance of [(P(DA,A)–P(DA,B))-(P(RT,A) – P(RT,B))]
- Limit ability of market participants to move congestion between day-ahead and real-time markets through unilateral actions
  - Many convergence DEC and INC bids around market clearing price makes it more difficult any individual bidder to move congestion charges

## Goals of Convergence Bidding (CB)

- Market efficiency benefits of convergence bids
  - A supplier or load with superior information can use convergence bids to commit generation unit in DA needed to meet real-time demand
  - Virtual supply can also displace physical supply if market participant believes that real-time demand will be sufficiently low so that a unit is not required
- In both of these circumstances, convergence bidding can reduce the total cost of meeting demand in real-time



## Benefits and Costs of Greater Granularity

- More beneficial uses of convergence bidding with greater granularity
  - Generators that schedule in DA market can use virtual transactions to sell at RT price
    - Schedule 50 MWh in DA market and buy 50 MWh of virtual demand in DA market
    - Produce 50 MWh which is sold at RT price
  - Clear DA Congestion Revenue Rights (CRR) in RT market
    - Suppose market participant holds10 MWh CRR from A to B
      - CRR revenue stream is ($P_B - P_A$) from DA market
    - Buy10 MWh of virtual demand at B and sell10 MWh of virtual supply at A
      - Payoff of combined CRR and virtual transactions is ($P_B - P_A$) from RT market
  - Actions ensure nodal price and congestion convergence between DA and RT markets
- These uses of convergence bids are not possible with LAP-level virtual bids
  - LAP-level bidding can only make DA and RT LAP prices converge
  - Large and systematic differences between nodal prices can persist

## Benefits and Costs of Greater Granularity

- More potential harm from convergence bidding with greater granularity
  - Seller's choice contracts issue
    - Use convergence bids to reduce price at seller's choice delivery node or increase DA physical deliveries beyond what is physically feasible.
  - Local market power mitigation mechanism
    - Virtual transactions can prevent bids of physical units from being mitigated
- Virtual bids can be used to make CRRs more valuable
  - Increase magnitude of congestion and payments from CRR ownership
- Conclusion—Greater safeguards are necessary with more granular convergence bidding
  - Set locational position limits for nodal convergence bids
  - Day-ahead local market power mitigation mechanism based on physical supply and demand



## Local Market Power Mitigation

- Addressing market power problems with nodal convergence bids
  - Apply local market power mitigation with physical offers from generation units and ISO load forecast
    - Ensures that all market participants know that there is sufficient mitigated supply to be able to meet expected demand
  - Set position limits on bids and offers at individual nodes based on P(max) and peak demand at that node
  - Position limits do not prohibit market participants from taking larger positions at a given node
    - Market participant must use bilateral market to purchase a larger position
    - Seller in bilateral market can use ISO markets, up to its position limit, to hedge this risk

## Benefits and Costs of Greater Granularity

- Position limits on bids and offers can be increased as ISO and market participants gain greater confidence with nodal convergence bids
- Gradual transition from 10 percent to no position limits at individual nodes
  - Because problems at smaller position limits are likely to get worse at higher position limits, this strategy is appropriately cautious
- Alternative strategy--Start with LAP-level convergence bidding and transition to greater granularity
  - Downside of this approach
    - No problems at LAP level does not mean that significant problems won't arise with greater granularity
    - Limited benefits from LAP-level convergence bidding, particularly for generation unit owners and energy traders
      - LAP level CB volume may not be predictive of nodal level CB volume



## Convergence Bidding at Interties

- All day-ahead schedules at interties are "virtual" because resources providing import or export schedule have not yet been tagged
- Enforcing two sets of transmission constraints at interties may have unintended consequences
  - Physical imports and exports
  - Physical imports + virtual imports and physical exports + virtual exports
- Internal convergence bids clear against real-time price
- Intertie convergence bids clear against hour-ahead scheduling process (HASP) price
  - Several interties can be dynamically scheduled so that energy can be sold at real-time price
  - Entities with ability schedule dynamically may be able to profit from day-ahead and HASP price differences at intertie
- All of these factors argue in favor of smaller position limits at interties

# Cost Allocation for CB

- Cost causation in allocating uplift charges
  - If convergence bidders increase charges, they should pay
  - If convergence bidders reduce charges, they should be paid
  - Cost causation often difficult to determine, so focus on easy-to-determine causation costs
- Symmetry in cost allocation to physical and virtual load is a useful principle subject following caveats
- Avoid making cost of virtual bidding higher than cost of implicit virtual bidding
  - Particularly problematic at interties where there is little distinction
- Unclear why a per bid increment transaction cost is needed at start of convergence bidding
  - Works against goal of encouraging market participants to submit convergence bids, even with refund against GMC charges of accepted convergence bids
  - Department of Market Monitoring (DMM) should have ability to implement charge, if it is determined to be necessary



# Congestion Revenue Rights Refunds

- Convergence bidding can be used to enhance Congestion Revenue Rights (CRRs) revenues earned
  - PJM and other eastern ISO have rules for issuing CRR refunds when day-ahead congestion differs from real-time congestion
  - Theory of CRR refund rule makes sense, but it is difficult to implement in practice
    - Hard to determine cause of differences between day-ahead and real-time congestion
  - Focus design of CRR refund rule to catch most obvious cases rather than all cases

# Regulatory Issues

- Key to convergence bidding improving energy market efficiency is ability of three investor-owned utilities to earn profits and losses from these activities
  - California Public Utilities Commission (CPUC) must provide financial incentives for these entities to be active participants
- Day-after release of information on convergence bids to market allows market participants to protect themselves
- Department of Market Monitoring should be able to
  - Change position limits at location
  - Limit locations where a participant can submit convergence bids
  - Suspend convergence bidding at locations and for market participants



# Conclusions

- Nodal convergence bidding can improve market efficiency and system reliability
  - All market participants must have ability and incentive to benefit from convergence bidding CB
  - Position limits are necessary to protect consumers during initial period of nodal convergence bidding
  - Local market power mitigation should be performed based on physical supply and demand resources
  - Ensure that round-trip (DA and RT costs) of CB transaction is always less that round-trip costs of implicit virtual transactions
  - DMM should have discretion to intervene to ensure that convergence bidding is benefitting market efficiency