Straw Proposal for Design of Convergence Bidding

Margaret Miller
Senior Market Design and Policy Specialist

Convergence Bidding Stakeholder Meeting
July 9, 2009
Meeting Objectives

- To review policy and invite input on and on key implementation and policy features for virtual bidding

- Straw Proposal posted on July 2 at:

- Written comments are requested by close of business July 24 to
  [convergencebidding@caiso.com](mailto:convergencebidding@caiso.com)
What will be reviewed during today’s meeting?

- **Implementation Issues**
  - Discuss ongoing activities around implementation
  - Options to resolve Resource ID issue

- **Review design elements covered in Straw Proposal**
  - Granularity
  - Interties/Hubs
  - Information Release
  - RUC
  - Changes to Day-Ahead process
  - Cost Allocation
  - Review Credit Policy
Implementation Issues

Janet Morris
Program Office
Proposed Release Plan (as discussed on 6/24/09)

- **April**: Payment Acceleration
- **May**: Pre-Summer Release, New Network Model, Critical Variance Fixes
- **June**: Post-Summer Release, Enhancements, Variance fixes, Master File II, CRR Enhancements
- **July**: Standard Capacity Product, AS Must Offer*, SIBR 3.10, Revised DEC Bidding*, Rule (if needed)
- **August**: Multi-Stage Generator Modeling
- **September**: Spring Release, Scarcity Pricing*, Proxy Demand Resources*, Market Design Performance Enhancements, Deferred Items
- **One year after Go-Live**: Convergence Bidding*, Participating Load Refinements*, Credit System Enhancements

* MAP scope items
Current activities regarding Convergence Bidding

- Seeking stakeholder comments on proposed release plan by 7/17/2009
- Discussions underway with other ISOs regarding their implementation of virtual bidding
- Evaluation of simplification in convergence bidding requirements with software vendor to reduce implementation effort
  - Impose additional limits on virtual bidding
  - Relax requirement for AC power flow solution
- Option analysis of phased approach to explore earlier delivery of partial functionality – will result in greater overall cost and schedule of full scope
  - Limit convergence bidding to only LAPs and Interties
  - Limit convergence bidding to only LAPs, Interties and Trading Hubs
- Proceeding with plan of record as of now
Options for Convergence Bidding Resources IDs

- Option 1: Status Quo – register each SC at each node for potential virtual supply and virtual demand bids [not feasible]
- Option 2: Nodal Resource ID – each pricing node designated for virtual bidding transactions would have a defined virtual product type
- Option 3: Product Type – Define new product type at each Pnode
- Option 4: Revised Modeling Approach - Two IDs for each SC (virtual supply and virtual demand)
- Option 5: Additional Field for Certified SCs

Recommendation: Option 4 or 5
Benchmarking with other ISOs on Bid Volumes

Margaret Miller
Senior Market & Product Specialist
### CB Benchmarking

<table>
<thead>
<tr>
<th>Region</th>
<th>PNodes</th>
<th>Bid at PNode</th>
<th>SCs</th>
<th>Physical*** Bids Count</th>
<th>Virtual Bids Count</th>
<th>% VB Count</th>
<th>Physical Bids MW</th>
<th>Virtual Bids MW</th>
<th>% VB MW</th>
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<tbody>
<tr>
<td>PJM</td>
<td>8290</td>
<td>8290</td>
<td>550</td>
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<tr>
<td>NYISO</td>
<td>6000**</td>
<td>300</td>
<td>370</td>
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<tr>
<td>MISO</td>
<td>1896</td>
<td>1896</td>
<td>300*</td>
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<tr>
<td>ISO-NE</td>
<td>952</td>
<td>952</td>
<td>400</td>
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<tr>
<td>CAISO</td>
<td>3500</td>
<td>3500</td>
<td>100</td>
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</tbody>
</table>

*See Graphs from State of Market Report*
## CB Benchmarking (Slide 2 of 3)

<table>
<thead>
<tr>
<th></th>
<th>Min Max</th>
<th>Admin Fees</th>
<th>Transaction Fees</th>
<th>BCR Uplift Fees</th>
<th>Bid Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJM</td>
<td></td>
<td>Yes</td>
<td>.06 per bid segment .045 for cleared bids</td>
<td>Yes</td>
<td>1. Ability to impose SC Daily Limit 3000 bid/offer segments 2. Credit limits</td>
</tr>
<tr>
<td>NYISO</td>
<td>1 MW for first bid segment</td>
<td>Yes</td>
<td>.10 per submitted virtual bid regardless of segments .05 for cleared bids (credited 50%) Sliding scale based on SCUC performance (min .03 – max $1.00)</td>
<td>Yes</td>
<td>1. Total Volume 2X Generation Capacity at Location 2. Soft Bid Volume Cap 3. Credit Limits</td>
</tr>
<tr>
<td>MISO</td>
<td>0.1MW</td>
<td>Yes</td>
<td>No transaction fees</td>
<td>Yes</td>
<td>1. Daily Virtual MW Limit can be imposed 2. Credit Limits</td>
</tr>
<tr>
<td>ISO-NE</td>
<td>1 MW</td>
<td>Yes</td>
<td>.005 per bid segment .06 bid cleared</td>
<td>Yes</td>
<td>1. Bid limits unknown 2. Credit Limits</td>
</tr>
<tr>
<td>CAISO</td>
<td>1 MW</td>
<td>Yes TBD</td>
<td>To be determined</td>
<td>Yes</td>
<td>1. Credit Limits 2. Other limits to be determined</td>
</tr>
</tbody>
</table>
## CB Benchmarking Sources

<table>
<thead>
<tr>
<th>Source</th>
<th>Details</th>
</tr>
</thead>
</table>
| PJM    | 2008-annual-report.ashx, Imp-model-info  
| NYISO  | DVT Concept Design 6/26/09, Approved Customer List |
| MISO   | [http://www.caiso.com/200c/200c8a5c1f8d0.pdf](http://www.caiso.com/200c/200c8a5c1f8d0.pdf), MidwestISOFactSheet_May09.pdf, Market BPM |
### PJM State of the Market Q1’09

#### CB is 17% Cleared Demand

<table>
<thead>
<tr>
<th></th>
<th>Cleared Fixed Demand</th>
<th>Cleared Price Sensitive</th>
<th>Cleared DEC Bid</th>
<th>Total Load</th>
<th>Real Time</th>
<th>Average Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average</strong></td>
<td>76,683</td>
<td>2,018</td>
<td>15,882</td>
<td>94,583</td>
<td>81,174</td>
<td>13,409</td>
</tr>
<tr>
<td><strong>Median</strong></td>
<td>76,088</td>
<td>2,029</td>
<td>15,969</td>
<td>94,205</td>
<td>80,261</td>
<td>13,944</td>
</tr>
<tr>
<td><strong>Standard deviation</strong></td>
<td>10,701</td>
<td>344</td>
<td>2,241</td>
<td>12,828</td>
<td>11,715</td>
<td>1,113</td>
</tr>
</tbody>
</table>

#### CB is 14% of Cleared Supply

Approx 30 – 40% additional virtual bid volume submitted but not cleared
NYISO May ’09 Monthly Report

Cleared VB ~5% DAM

~20% VB not cleared in DA
MISO May ‘09 Market Report

VB ~10% DAM in ‘08

’09 VB Approaching 5% DAM
ISO-NE 2008 Annual Markets Report

Figure 3-5: Day-ahead demand by category.

Figure 3-6: Day-ahead supply as a percentage of total cleared supply.
Straw Proposal Review – Granularity & Information Release

Margaret Miller
Sr. Market Design and Policy Specialist
The proposal for a number of design elements were revised in the Straw Proposal

<table>
<thead>
<tr>
<th></th>
<th>Granularity</th>
<th>Bid Features</th>
<th>Credit</th>
<th>Interties/Hubs</th>
<th>Cost Allocation</th>
<th>Information Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revised</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Market participants continue to be divided on the topic of spatial granularity of convergence bids

- Supplier and Traders are advocates for nodal virtual bidding
- Other entities advocate as strongly that virtual bids should be submitted and settled only at the three LAPs, consistent with the way most physical demand will be settled under MRTU
LAP Level Convergence

![Bar chart showing LAP level convergence for PGAE, SCE, and SDGE for months April, May, and June, with different colors representing DA, HASP, and RTD.]
Benefits of Convergence Bidding at nodal level

- Nodal level convergence bidding will allow better price convergence than LAP level
- Ability for physical generators to hedge their production
- Ability to hedge intermittent wind – Virtual supply bids could be used to account for anticipated intermittent generation in the DAM
- Explicit identification of financial transactions at the inter-ties
- Allow for more accurate demand bidding at the nodal level resulting in more efficient unit commitment.
Benefits of LAP level convergence bidding

- Ability to offset under scheduling of load
- Price convergence
- Less concern over market manipulation
The ISO proposes nodal convergence bidding with initial 10% position limits

- 10% limit would move to 50% limit at six months and be eliminated after 12 months
- Position limits suggested by MSC and recommended by DMM in design comments provided in 2007
Position limits would be set based on the following criteria:

<table>
<thead>
<tr>
<th>Generation Nodes</th>
<th>Load Nodes</th>
<th>Scheduling Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tied directly to the capacity of the generator</td>
<td>Either by maximum MW amount that flows over that node over a period of time, or by the MWh volume of the peak withdrawal at each node</td>
<td>MW value would be based on 10% of the rated capacity of the intertie.</td>
</tr>
</tbody>
</table>
ISO proposes to release virtual bid information on the same timeline as physical bid information

- Currently physical bid information is posted 180 days following the trade date
- CAISO has filed with FERC for authority to release bid data on a 90-day lag schedule per FERC Order 719
Straw Proposal Review – Interties and Trading Hubs

Gillian vanOosten Biedler
Senior Market Design & Policy Specialist
Convergence Bidding at the Interties

- The ISO proposes to allow convergence bidding at the interties
- Other ISOs enable virtual trading at their ties points, and have not found this to negatively impact reliability
- Convergence bids will be liquidated at the HASP price
- Other than resource-specific system resources, interties will not be considered in RUC
Allowing convergence bidding at the inter-ties makes legitimate those transactions that might occur implicitly otherwise.

Convergence bids on the ties would settle as the difference between the IFM price and the HASP price.

Requirement for e-tagging on the interties has been added to Market Initiatives Roadmap.
An important concern with CB at the ties is the potential for virtual congestion:
- This could hinder our ability to import Energy and A/S in the Day Ahead Market.

If the transmission constraint is binding, DA virtual bids that exacerbate congestion prove to be losing transactions.

An example…
Case 1: Net Inbound Energy (Imports > Exports)

- **Case 1a**: Imports + Virtual Imports (VSup) > Exports
  - Transmission constraint is binding → Congestion
  - Importer is paid a low price in the IFM
  - Congestion is relieved as virtual imports are settled out in HASP
  - HASP price for imports is higher as a result, and the virtual importer has to buy back his position at that higher price.
  - This was a **losing** transaction.

- **Case 1b**: Imports > Exports + Virtual Exports (VDmd)
  - Transmission constraint is binding → Congestion
  - Exporter pays a low price in the IFM
  - In the HASP, congestion is relieved as virtual exports are settled out.
  - HASP price for exports is higher as a result, and the virtual exporter is paid back at the higher price.
  - This was a **winning** transaction.
Case 2: Net Outbound Energy (Imports < Exports)

- **Case 2a: Imports + Virtual Imports (VSup) < Exports**
  - Transmission constraint is binding → Congestion
  - Importer is paid a **high** price to relieve congestion in the IFM
  - Congestion is relieved as virtual imports are settled out in the HASP
  - HASP price for **imports** is now **lower**, and importers buy back at that lower price.
  - This is a **winning** transaction

- **Case 2b: Imports < Exports + Virtual Exports (VDmd)**
  - Transmission constraint is binding → Congestion
  - Exporter pays a **high** price in the IFM.
  - In the HASP, the congestion is relieved as virtual bids settle out
  - The HASP price for **exports** is now **lower**, and exporters are paid back at that lower price.
  - This is a **losing** transaction.
Convergence Bids at Trading Hubs

- Trading Hubs are not currently part of the MRTU optimization.
  - Trading Hub prices are part of a settlement service for ISTs
  - Trading Hub prices are calculated *ex post*

- The ISO proposes to incorporate Trading Hubs into the optimization as Custom Load Aggregation Point (CLAPs)
  - Not a perfect hedge since ISTs still settle outside the market
  - Restricted to convergence bids
Straw Proposal Review – RUC Compatibility

Lorenzo Kristov, Ph.D.
Principle Market Architect – Market and Infrastructure Development
Two potential concerns have been raised related to RUC and its compatibility with CB

- Potential to earn a RUC availability payment providing perverse incentives for a supply resource with non-RA capacity to submit virtual supply bids to defer scheduling of its non-RA capacity to the RUC

- Infeasible schedules resulting from supply resources within generation pockets bidding virtual demand at that same location
As a starting point the ISO does not believe either scenario would materialize as it would not be profitable for the bidder

- The ISO invites stakeholders to comment on these and other concerns regarding compatibility of convergence bidding and RUC designs
- Please submit detailed scenarios via written comments to convergencebidding@caiso.com
Straw Proposal Review – Changes to Day-Ahead Process and Cost Allocation

Margaret Miller
Senior Market Design and Policy Specialist
Changes to Pre-IFM Process

- Maintain the MPM/RRD run, but use Bid-in Demand rather than forecasted Demand
  - Virtual bids may impact the market power of physical bids
  - Aligns bid mitigation with the IFM
  - LECG recommendation and FERC directive to use Bid-in Demand

- Unrestrict the generating units that are considered in the IFM
  - Restriction not needed if Bid-in Demand is considered in the pre-IFM process
  - IFM may commit some generators that have not been committed in the pre-IFM run
Changes to Pre-IFM Process

- Previous proposal was to manually commit needed RMR Units
  - Using Bid-in Demand may commit fewer RMR units than would be needed
  - ISO reconsidering whether another pass to automate commitment of RMR units may be a better option
Review of CB cost allocation proposal

- Allocate IFM Tier 1 Uplift to virtual demand only in the case where virtual demand plus physical demand exceeds the CAISO Forecast.
- Allocate RUC Tier 1 Uplift to virtual supply based on the quantity of physical supply that was displaced by virtual supply in the DAM resulting in the need for the CAISO to procure additional supply in RUC.
- SCs obligation based on the pro-rata share of the total obligation as determined by the total (gross) cleared virtual demand or the total (gross) cleared virtual supply bids.
- No allocation of Real-Time Bid Cost Recovery Uplift to virtual transactions.
Average Rates for Bid Cost Recovery

The chart shows the average rates for bid cost recovery across different months. The rates are depicted in dollars per megawatt-hour ($/MWh) for different categories: IFM_RATE, RTM_RATE, and RUC_RATE. The rates are calculated as follows:

- **April**: IFM_RATE = 0.15, RTM_RATE = 0.12, RUC_RATE = 0.09
- **May**: IFM_RATE = 0.39, RTM_RATE = 0.36, RUC_RATE = 0.33
- **June**: IFM_RATE = 0.27, RTM_RATE = 0.24, RUC_RATE = 0.21
- **Grand Average**: IFM_RATE = 0.24, RTM_RATE = 0.21, RUC_RATE = 0.18
Updates to Cost Allocation Proposal for IFM and RUC

- Virtual Supply obligation to pay RUC Tier 1 Uplift would be based on pro-rata share of the total obligation as determined by their total (net) virtual supply bids.

- Virtual Demand obligation to pay IFM Tier 1 Uplift would still be based on pro-rata share of total obligation based on gross virtual demand.
Updates to Cost Allocation Proposal for Real-Time Bid Cost Recovery

- Costs related to bid cost recovery for short-start units started in Real-Time as a result of a RUC schedule will be allocated to net virtual supply and underscheduled load.

- These costs would now be allocated through RUC Tier 1 Uplift rather than through Real-Time BCR Uplift.

- Costs attributed to other factors that result in Real-Time uplift will continue to be allocated to Measured Demand until two-tier charge is developed.
Credit Policy for Convergence Bidding

Shucheng Liu, Ph.D.
Principal Market Developer

July 9, 2009
Proposed credit policy provides protection against financial risks in Convergence Bidding.

- Performing credit check based on dollar value of Virtual Bids
- Rejecting Virtual Bids failing credit check following the last in, first out rule
- Updating credit information dynamically (daily)
Value of Virtual Bids is compared to Available Credit at the time of submitting bids.

\[ \left( \sum_{i} \text{Reference Price} \times \text{abs}(VBMW_i) \right) \leq \text{Available Credit} \]

- Reference Price – 95th percentile value of historical price differentials for each season and each LAP
- Absolute value of MW of all virtual bids are included except if both virtual demand and supply bids are submitted by the same the SC at the same location for the same hour. The greater MW value will be used then.
- 100% Available Credit can be used
- Available Credit is updated daily
- Rejecting Virtual Bids follows the rule of last in, first out
Estimated values of cleared Virtual Bids of Day $T$ are calculated using reference prices.

\[ \text{Estimated VB Value} = \sum_i \text{Reference Price} \times \text{abs(Cleared VBMW}_i) \]

- This is after the close of Day-Ahead Market (DAM), but before the close of Real-Time Market (RTM) for VBs put in on Day $T$
- Estimated Virtual Bid Value is calculated using Reference Price and absolute value of Virtual Bid MWs cleared in DAM
Estimated values of cleared Virtual Bids of Day $T-1$ are re-calculated using MCPs.

\[
\text{Estimated VB Value} = \sum_{i} \Delta \text{MCP}_i \times \text{Cleared VBWM}_i
\]

\[
\Delta \text{MCP}_i = \text{MCP}_{DA,i} - \text{MCP}_{RT,i}
\]

- Estimated Value of Virtual Bid cleared in Day $T-1$ is re-calculated once MCPs become available after the close of RTM on Day $T$
- MCPs are either nodal or LAP-average LMPs
- MCPs are still subject to verification and correction
- Estimated Virtual Bid Value could be positive or negative
Available Credit is adjusted daily.

- Estimated Virtual Bid Value of Day $T$ is added to the EAL to adjust Available Credit
- Estimated Virtual Bid Value of Day $T-1$ already in EAL is updated with MCPs
- Available Credit is adjusted with the final Virtual Bid Values
Available Credit is adjusted daily.

- Estimated Virtual Bid Value of Day $T$ is added to the EAL to adjust Available Credit
- Estimated Virtual Bid Value of Day $T-1$ already in EAL is updated with MCPs
- Available Credit is adjusted with the final Virtual Bid Values
QUESTIONS ?
Next Steps

- Stakeholder comments due by close of business July 24
- Next meeting planned for end of August
- Remaining meetings/calls scheduled as needed
- Final Proposal due by mid-November to meet December board deadlines