CAISO Convergence Bidding Implementation
CAISO Convergence Bidding (CB) Background

• Allows market participants to submit virtual (financial) demand and supply bids into the Day Ahead market
  – A virtual demand bid that clears the DA Market creates a virtual supply award in the RT Market
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• CB intended to drive Day Ahead and Real Time prices together
  – Expectation that new and existing market participants will arbitrage DA / RT price spreads
  – Reduces incentive for bidders to forgo clearing physical schedules in the Day Ahead market in anticipation of better pricing in the Real Time market
Convergence Bidding Regulatory Process

• FERC required the CAISO to implement CB within 12 months of MRTU (9/21/06 MRTU Order)
  – FERC approved delay of implementation until February 1, 2011 (issued 2/18/10)
  – CB (aka Virtual Bidding) has been implemented in PJM, NYSO, NE-ISO and MISO

• SDG&E, SCE and PG&E must apply for and receive CPUC approval to participate in CB market
  – Part of the Long Term Procurement Plan process (LTPP)

• CAISO will implement CB per FERC order. SDG&E plans to participate in CAISO market simulation, which begins October 1
SDG&E Proposed CB Applications

1. Shifting Wind Generation from RT to DA Market
   - SDG&E has 255 MW (nameplate) of wind resources. Currently this wind generation is only scheduled in the RT Market due to contract and CAISO constraints
   - CB provides a mechanism to effectively shift wind generation into the DA Market allowing SDG&E to financially offset its load requirements scheduled in DA Market
   - SDG&E could submit a virtual supply bid into the DA Market for the forecasted wind generation. If cleared, it would create a virtual demand award in the RT Market that would hedge the physical supply of wind generation
**Product 1: Use CB to Shift Wind Generation Schedules**

- SDG&E’s 255 MW of wind generation is currently scheduled into the RT Market. This creates a long exposure to RT prices while providing no benefit against load requirements scheduled in the DA Market.

- Virtual supply award “shifts” wind generation into DA Market, resulting in a better match against load requirements. The DA virtual supply creates a RT virtual demand which hedges long exposure to RT prices from physical wind generation.
SDG&E Proposed CB Applications

2. Hedging Generation Returning to Service

- Generators frequently experience delays or operational problems returning to service after a long down period (e.g. economic shutdown or maintenance outage). If a SDG&E generator fails to meet a DA Market award, SDG&E must buy back the awarded quantity at prevailing RT Market prices.

- CB provides a mechanism to offset some or all of the generator’s expected DA Market award. SDG&E could submit a virtual demand bid into the DA Market; if cleared, it would create a virtual supply award in the RT Market.

- Should the generator fail to meet its DA Market award, the buy-back of the physical generator award in the RT Market would be hedged with the RT virtual supply award.
Product 2: Use CB to Hedge Generator Return to Service

- A generator that does not meet its DA Market award creates a short position in the RT Market. SDG&E must buy back the unfulfilled DA award quantity at RT prices.

- A virtual demand bid that clears the DA Market would offset some or all of the generator’s physical supply award, resulting in a hedge against buyback costs in the event the generator does not return to service to meet its DA award.
Proposed Convergence Bidding Applications

3. Hedging Bundled Load Forecast Risk

- SDG&E can only schedule its load requirements in the DA Market. At times uncertainty in the load forecast increases, such as during weather pattern transitions and on holidays. Any forecast error is settled out at RT Market prices

- Under-forecasted load is settled as residual physical demand in the RT Market. Over-forecasted load is settled as residual physical supply in the RT Market

- CB enables SDG&E to increase (or decrease) its load schedule through a virtual demand (or supply) bid in the DA Market. A virtual bid would avoid altering the physical load schedule that is produced from an established load forecasting process

- If awarded, a DA virtual demand bid would create a RT virtual supply award that would hedge the RT physical demand caused by the under-forecast of load
Product 3: Use CB to Hedge Load Forecast Uncertainty

- Load forecasting uncertainty can result in under-purchasing load requirements in the DA Market, resulting in exposure to RT Market prices for residual load requirements

- Virtual demand awards increase purchases in the DA Market, resulting in a hedge against residual demand purchases in the RT Market due to under-purchasing of load requirements in the DA Market
Proposed Convergence Bidding Applications

4. Defensive Price Arbitrage

• Once CB goes live, SDG&E will monitor prices in our LAP and at Pnodes outside of our LAP where we have generation resources, to determine whether they appear consistent with expectations

• Monitoring methods and metrics will be developed to define instances of price distortions and to trigger defensive Convergence Bidding

• P/L of such activity will be tracked against pre-established limits. SDG&E also intends to report any inconsistencies and anomalies to the CAISO

Example:

• A Pnode within SDG&E’s DLAP consistently settles at much higher price than the other DLAP Pnodes in DA, but converges with other Pnode prices in RT

• SDG&E may choose to submit a CB to sell in the DA (virtual supply bid) and buy back in RT. This would likely have 2 effects:
  – Lower the DA price at the Pnode, when the majority of Load is purchased
  – If the pricing irregularity persists SDG&E would benefit from selling at a higher price in DA and purchasing back in RT
Convergence Bidding Market Safeguards

- Bid Limits: CAISO will phase in position limits at each Pnode to implement Convergence Bidding in stages.

- RUC Process: CAISO will not consider virtual supply that clears the DA Market as capacity that will serve the forecasted load. If virtual supply displaces physical supply based on a lower bid, CAISO will RUC additional capacity to preserve reliability.

- CRR revenue claw back: CAISO will monitor each market participant’s Convergence Bidding activity to ensure it is not used to generate profits on that market participant’s CRR portfolio. Profits from such activity will be rescinded.

- Credit Requirements: CAISO will require credit to support each Convergence Bid. Requirements will be based on the 95th percentile of historical price spreads between the DA and RT Market prices, resulting in a conservatively high credit requirement to discourage rampant bidding activity.

- Convergence Bidding fee: CAISO will charge a $0.005/MWh fee per virtual bid submission to discourage widespread bidding activity which may overload CAISO system processes.
## Convergence Bidding - Next Steps

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<thead>
<tr>
<th>Activity</th>
<th>Date</th>
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<tr>
<td>IOUs submitted proposals for Convergence Bidding participation</td>
<td>August 16</td>
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<tr>
<td>CPUC workshop for IOUs to discuss/present their proposals</td>
<td>August 23</td>
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<tr>
<td>CPUC Decision on IOU participation in CB</td>
<td>October</td>
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<tr>
<td>SDG&amp;E LTPP compliance filing to include Convergence Bidding as authorized product</td>
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