Virtual Bidding in MRTU

Jeffrey Nelson, CFA
Manager of Market Design and Analysis
Southern California Edison

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Virtual Bidding – SCE’s Position

- SCE supports the implementation of Virtual Bidding (aka “Convergence Bidding”) as a Release 1A item
- Virtual bidding (VB) should not be implemented in California until MRTU has demonstrated proper functioning for a period (e.g. 12 months)
- Appropriate oversight and design rules must be in place to prevent market manipulation when VB is implemented
  - LAP level bidding only for initial implementation
  - Immediate release of all VB information
- A potential significant asymmetry would exist absent rules from the CPUC for VB use by IOUs

Why does SCE Support VB?

- VB provides a tool which transparently identifies “explicit” virtual transactions; conversely, it reduces likelihood of “implicit” virtual transactions
  - It is better for the CAISO to have visibility over financial transactions rather than have them “guess” if a bid is physical or financial
- The presence of VB puts to rest, once and for all, concerns that load may “underschedule” to depress prices
- In some cases, VB provides a legitimate tool to mitigate risks
  - Note that risk mitigation always comes at a cost, VB rules must not shift these costs inappropriately

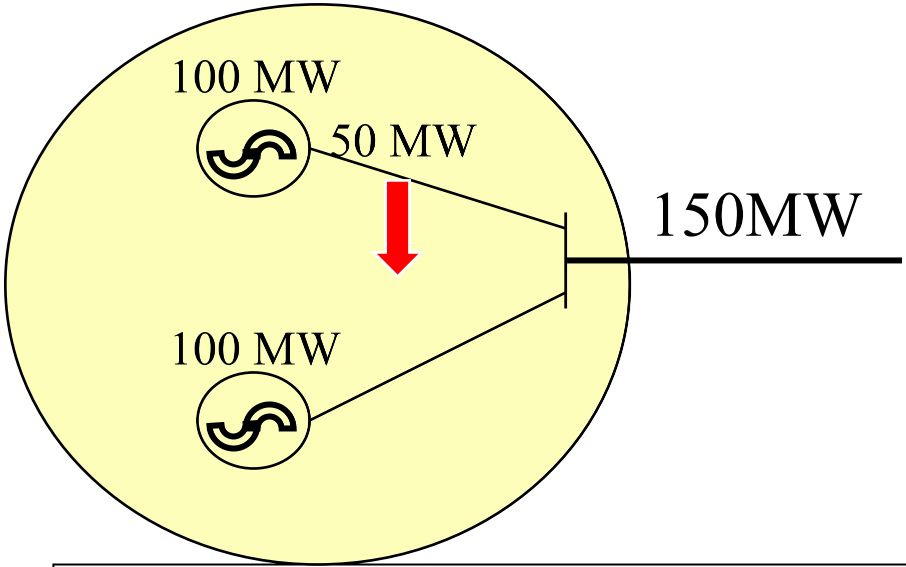
Why does SCE Support VB only at the LAPs?

- VB **<u>must not be allowed</u>** to undermine the foundational justifications and design objectives of MRTU
  - Feasible schedules
  - An <u>efficient optimization</u> based on three-part bids
    - Sellers have incentives to bid their true production costs
  - Effective local market power mitigation
  - Effective market monitoring and a design that is less susceptible to manipulation
- In addition, nodal virtual bidding is *inconsistent* with the MRTU market design
  - Physical load is only allowed to bid at LAPs
  - The use of LDFs
  - Physical SC trades

Nodal VB: Impacts on Feasibility

- SCE has concluded that nodal VB can/will create infeasibility issues
  - Either MRTU cannot resolve these issue without a "manual work-around", or
  - MRTU has the potential to address these issue in a very costly and inefficient manner
- The RUC process is designed to dispatch additional capacity given a feasible starting point
  - RUC cannot "decommit" units selected in the IFM or dispatch these unit down
  - Examples follow
- LAP-level VB largely addresses this issue

Nodal VB: Example on Feasibility



- Consider the following "gen pocket"
  - Total generation = 200MW
  - XMSN capability = 150MW
- Unlike today, the MRTU design (without VB) will prevent both generators from scheduling and overloading the line

- Now consider the addition of a 50MW "Virtual Load" bid at one of the generators
- Net "flow" is 150MW, and both generators can schedule total output in the IFM = **INFEASIBLE SCHEDULES**
- RUC has no (efficient) way of solving this problem
- Even if RUC *commits* enough capacity so that the problem can be resolved, the CAISO will have to redispatch the system in real-time to fix this problem

Nodal VB: Impacts on Optimization Efficiency

- At it core, any “problems” created by VB are solved by a very inefficient objective function
  - RUC minimizes startup and non-load costs, rather than total costs
- Any use of the “RUC” objective function reduces market efficiency
- While LAP level VB promises to reduce reliance on the “RUC” objective function, nodal level cannot make the same claim
  - In fact, nodal VB may increase reliance on the RUC objective
- As a result, the societal impacts of VB must account for potential efficiency losses created by VB

Nodal VB: Impacts on Optimization Efficiency

Table 1 – Impact of Virtual Bids on the Physical Dispatch

Owner	Size (MW)	Variable Cost ($/MWh)	Startup/no-load ($/MWh)	Long Startup?	Total Cost (1 hour)
A	101	50.01	6	Yes	$5,601
B	101	55	2	No	$5,700

- Consider cases with and without Virtual Bidding
- Without VB, if suppliers bid competitively, Owner A will be dispatched and Owner B will not run
- With VB, if Owner B offers VBs with a total least cost solution of $5,601, it will be selected
  - Owner B can submit a Virtual Bid to sell 100MWs @ $56/MWh and completely displace Owner A

VB: Shifting Objective Functions

Objective:
Minimize Total Cost

Objective:
Minimize Start-up &
Min-load costs

Day-ahead Market (HE1-24)

Residual Reliability Commitment

Real-time Market

≈T-18 hours

≈ T-6 hours

T-0 hours

Virtual generation
is selected
(total cost of $5600 vs. $5601)

Physical Generation
unit B selected
(Startup cost of $2 vs $6)

Nodal VB: Impacts on Optimization Efficiency

Table 2 – Comparison of Market Results with and without Virtual Bids

	Without Virtual Bids	With Virtual Bids
Generator A Output	100MW	0 MW
Generator B Output	0 MW	100MW
Day-ahead Clearing Price	$50.01/MWh	$56/MWh
Real-time Price	$50.01/MWh	$55/MWh
Profit to Virtual Bidder	N/A	$100
Total Cost to Load	$5,601	$5,800

- The most efficient outcome was not reached
  - Rather than unit A running 100MW, unit A did not run
  - Unit B ran at 100MW rather than 0MW
- Both day-ahead and real-time prices increased because of the VB
- The total cost to serve load increased about $200 (from $5,601 to $5,800)
- The strategy was profitable to unit B – they made $100

Nodal VB: Impacts on Physical Bidding

- On a nodal level VB can “undercut” a physical bid and displace physical generation
  - VB doesn’t have start-up and min-load (previous example)
  - Again this problem becomes a significant concern under nodal VB
- As a result, physical sellers, even if they fully expect they are economic and should run, may not clear the IFM
  - They may get picked up in RUC, but this is a capacity schedule, not an energy schedule
- As a result, physical generators may be forced to “Self-schedule” to clear IFM
  - Self-scheduling resources are not eligible for startup/min-load or bid-cost guarantees
  - As a result, the market has additional constraints, and sellers are not bidding their true costs
- Again, this reaction harms overall market efficiency and violates a key design object behind MRTU

Nodal VB: Concerns over Manipulation

- Compared to LAP level bidding, nodal level VB creates a host of additional market manipulation concerns
  - CRR/congestion manipulation
  - Local price distortions
  - Unit commitment distortions
  - VB + Uninstructed energy games
  - Virtual Withholding
  - False-triggering of LMPM
- The added complexity of nodal VB demands additional monitoring capability
- In addition, again nodal VB violates a key design objective of MRTU (to reduce the potential for manipulation)

Conclusions and Recommendations

- SCE supports Virtual Bidding at the LAP level & only after the core MRTU design has been tested/proven
  - VB gives the CAISO better visibility over "financial" transactions
  - LAP VB fully addresses "underscheduling"
- In contrast, the CAISO should not entertain any "enhancement" which undermines the original design objectives of MRTU
  - Compared to LAP level bidding, nodal VB threatens/undermines
    - Feasibility
    - Efficiency of the optimization
    - Incentives for participants to bid actual production costs
    - Efficacy of Local Market Power mitigation
    - Market Monitoring and a market design aimed at stemming opportunities for abuse
  - Don't sacrifice reliability and market efficiency to accommodate speculation
- Until such issues are resolved implement VB only at the LAPs