Virtual Bidding Cost Allocation

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Agenda

- CAISO virtual bidding cost allocation proposal
- SCE’s virtual bidding proposal
- Examples supporting SCE’s proposal
- Conclusion
CAISO’s Virtual Bidding Cost Allocation Proposal

- **Virtual Demand** will be charged IFM Tier 1 uplift if virtual plus physical demand is greater than or equal to the CAISO’s load forecast.
  - Total virtual demand IFM Tier 1 obligation will equal the quantity that virtual demand put the IFM solution above the CAISO forecast.

- **Virtual supply** will be charged RUC tier 1 uplift when it is determined that physical supply was displaced by virtual supply in the IFM.
  - Total virtual supply RUC Tier 1 obligation will be equal to the net of the cleared virtual demand and the total cleared virtual supply.
  - Proposal charges virtual supply RUC Tier 1 uplift only if the net of virtual supply and demand is positive net virtual supply.
SCE’s Virtual Bidding Cost Allocation Proposal

- Virtual demand will be charged IFM Tier 1 uplift costs regardless of the relationship between total cleared demand and CAISO load forecast.
  - Proposal treats virtual and physical demand equally.
  - As with physical demand virtual demand will be charged IFM Tier 1 uplift based on its percentage of the total cleared demand in the IFM.

- Physical demand will be charged RUC Tier 1 uplift based on the difference between forecast demand and total cleared demand.

- Virtual supply will be charged RUC Tier 1 uplift based on the amount of virtual supply that was awarded in the IFM.
  - Virtual supply will be charged RUC Tier 1 uplift based on its percentage of the total amount of additional supply that needs to be procured to replace virtual supply.
Why does the CAISO RUC Resources?

- The CAISO asks two questions in deciding how much to RUC:
  - 1) How much TOTAL LOAD cleared the IFM market vs. the CAISO forecast?
    - They RUC the delta if total load is below forecast
    - It doesn’t matter if the load is Virtual or Physical, will RUC the same amount irrespective of the composition of the cleared load – only the total quantity cleared matters
  - 2) How much of the total supply was virtual?
    - They RUC to replace the Virtual supply
    - They don’t care how much of the load was physical or Virtual, they RUC to replace the Virtual supply
SCE’s Virtual Bidding Cost Allocation Proposal

- Example 1- No Virtual Bidding (market clears 2,000 MW’s below forecast)
  - CAISO Forecast = 35,000MW
  - IFM Cleared Physical Demand = 33,000MW
  - Virtual Demand = 0
  - IFM Cleared Physical Supply = 33,000MW
  - Virtual Supply = 0
  - IFM Uplift = $12,000
  - RUC Uplift = $20,000*

<table>
<thead>
<tr>
<th></th>
<th>Day-Ahead Cleared Physical Demand</th>
<th>Day-ahead Cleared Virtual Demand</th>
<th>Day-Ahead Cleared Physical Supply</th>
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* RUC uplift is a result of total demand clearing below forecast

Conclusion 1: Physical demand is charged for both IFM uplift and RUC uplift.
SCE’s Virtual Bidding Cost Allocation Proposal

Example 2- Virtual Demand Only (market clears 2,000 MW’s below forecast)

- CAISO Forecast = 35,000MW
- IFM Cleared Physical Demand = 28,000MW
- Virtual Demand = 5,000MW
- IFM Cleared Physical Supply = 33,000MW
- Virtual Supply = 0
- IFM Uplift = $12,000
- RUC Uplift = $20,000*

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<td>$ 12,000</td>
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* RUC uplift is a result of total demand clearing below forecast

Conclusion 2: Virtual and physical demand contribute equally in causing IFM uplift and should be charged accordingly.

Conclusion 3: Physical load is charged RUC uplift for the 2,000 MW'S of demand that did not clear in the IFM.

Conclusion 4: As compared to example 1 virtual demand clearing the market does not impact RUC.
SCE’s Virtual Bidding Cost Allocation Proposal

- Example 3- Virtual Supply Only (market clears 2,000 MW’s below forecast)
  - CAISO Forecast = 35,000MW
  - IFM Cleared Physical Demand = 33,000MW
  - Virtual Demand = 0
  - IFM Cleared Physical Supply = 23,000MW
  - Virtual Supply = 10,000MW
  - IFM Uplift = $12,000
  - RUC Uplift = $120,000*

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* RUC uplift is a result of total demand clearing below forecast and cleared virtual supply

Conclusion 5: Regardless of virtual supply the CAISO still will have to RUC 2,000 MW’s to cover its forecast shortfall and charge that portion of the uplift to physical demand.

Conclusion 6: Additional 10,000 of RUC is caused by cleared virtual supply.
SCE’s Virtual Bidding Cost Allocation Proposal

- Example 4- Virtual Demand and Supply (market clears 2,000 MW’s below forecast)
  - CAISO Forecast = 35,000MW
  - IFM Cleared Physical Demand = 28,000MW
  - Virtual Demand= 5,000MW
  - IFM Cleared Physical Supply = 23,000MW
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* RUC uplift is a result of total demand clearing below forecast and cleared virtual supply

Conclusion 7: With both virtual supply and demand bids the CAISO will still have to RUC 2,000 MW’s to cover its forecast shortfall and 10,000 MW’s to cover cleared virtual supply.
Conclusion 8: It is arbitrary to assume that a 1:1 relationship exists between virtual demand and physical load. To the contrary a relatively small amount of additional total demand is cleared when you add virtual demand bids to the demand curve in the example shown above.
Conclusion

- SCE sees no justification for netting virtual supply and demand when allocating RUC uplift costs.
  - CAISO’s purchasing actions were not related to netting virtual supply and demand (see examples 2-4).
  - Therefore it is illogical to allocate uplift costs on netted virtual supply and demand.

- Unclear what impact virtual supply and demand have on price, quantity, and uplift.
  - Cannot assume 1 MW of Virtual demand reduces RUC requirements by 1 MW (see slide 11).

- What is clear is that everyone participating in the day-ahead market causes uplift.
  - Therefore, physical and virtual participants should share proportionally in the ISO’s uplift costs.
    - Both physical and virtual demand should be charged IFM Tier 1 uplift.
    - RUC caused by total demand clearing below forecast should be charged to physical load.
    - RUC caused by the replacement of virtual supply with physical supply should be charged to virtual supply bidders.