On the Economics of Entering Into and Perhaps Buying Out of Forward Commitments

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Background

- Monitoring Analytics report on Replacement Capacity, Dec. 2012
  - Notes that Demand Response providers buy back commitments at a higher rate
  - Frequently lower Incremental Auction (IA) prices create opportunity to sell in base residual auction, buy back in IA likely at a profit
    - But IMM has "identified no evidence" of any purely financial entities
- Changes to load forecasting methodology and more stable economic outlook may have eliminated the systematic over-forecasting that caused IA prices to be lower
- Recent "DR Plan Enhancements" tariff changes to ensure sellers are serious

Issues

- PJM: about 80% of IA buy bids are submitted at prices below base residual auction prices, “indicating a willingness to replace to potentially achieve financial gain” (CSTF, August 26, 2013)
- PJM: under existing IA design, PJM sellbacks result in “increased cost to customers with no corresponding benefit”
  - (Disagree, but it’s a different topic and not addressed in this presentation)
- PJM and others emphasize that commitments are “physical” and suggest that participants should only be permitted to buy out for “physical” (as opposed to “economic”) reasons
- Suggestions that financial gain from buying out of commitments should not be allowed (prevent buyback or claw back any gain)

Economics of Replacement Capacity

- While it may have been the case that some market participants offered capacity into a base residual auction with intention to buy out of the commitment… changes including the DR Plan Enhancements attempt to address that
- In this presentation I consider a market participant/capacity seller (could be generation, demand response, anything) who:
  1. Has, or plans to have, the physical ability to provide capacity in the delivery year (DY)
  2. Offers with the intention to provide capacity if the obligation is taken to DY
  3. Always offers competitively, that is, at avoided cost or opportunity cost

Avoided Cost or Opportunity Cost of Providing Capacity

- A capacity seller acting competitively will offer based on A*voided Cost:* the cost the capacity seller incurs if he has a capacity obligation, or avoids if he does not; or *Opportunity Cost:* the value of an opportunity that is foregone if there is a capacity obligation
  - Generation: without a capacity obligation, can avoid cost and risk of capacity performance obligations and penalties, can shut the plant down or mothball it, can export the capacity to an adjacent market, can maintain flexibility to pursue other options ….
  - Demand Response: avoided or opportunity cost is the lost value when curtailed, for instance, the expected value of lost industrial production

Example 1: Capacity Sale / No Buyback

- Capacity seller (gen, DR, other type), avoided cost = $100/MW-day
- Offers into the base residual auction at $100/MW-day (competitive)
- BRA clears at $150/MW-day; this participant clears, is committed
- A year later the IA for the same delivery year clears at $50/MW-day and our participant did not participate in the IA.

Is it a good thing that this participant remains committed to providing, at a cost of $100/MW-day, that which was offered and could be acquired in the IA for $50/MW-day??

Answer: No. This is economically inefficient. The efficient result would have the lowest cost providers providing the capacity.

Example 2: Capacity Sale / Economic Buyback

- Now suppose instead our participant offers into the IA to buy back his commitment, again using his avoided cost, $100/MW-day, as the offer price.
  - If IA price remains above his avoided cost offer he remains committed - good
  - If IA price falls to $50/MW-day, or anything below $100/MW-day, his buyback offer clears and he no longer is committed to providing capacity in the DY
  - If the buyback offer clears, its because there was another market participant willing and able to provide the capacity cheaper than his $100/MW-day
- Offering to buy back into the IA at avoided cost is competitive conduct and always achieves the efficient result. Not offering may not achieve the efficient result.
  - Note that if many market participants re-offered consistently at their avoided cost, price differentials between BRA and IAs might be small or nonexistent.

Oh, But the Financial Gain??!?

- If the IA clears at $50/MW-day, our participant buys back at $50/MW-day what he had earlier sold at $150/MW-day, for a $100/MW-day financial gain. Is there something untoward about this?
- Answer: NO, not under assumptions of this example.
  - The participant was committed to sell at $150/MW-day and would have fulfilled the obligation for that price had the IAs always cleared at or above his $100/MW-day avoided cost
  - Buying back provided a lower cost resource the opportunity to provide capacity – a good thing
  - Offering and clearing in the BRA and buying back in the IA contributed to price convergence between the two auctions – a good thing
  - Had the participant NOT offered and cleared in the BRA in the first place, the BRA price would have been even higher and more out of line with the value revealed in the IA – a bad thing

Example 3: Replacement – Bilateral Transactions

Our participant could also have been approached after the BRA by a capacity seller uncommitted in the BRA seeking a capacity commitment in the same zone

- Suppose quantities are the same and the seller reveals his avoided cost as $50/MW-day. Shouldn't they do the deal?
- "Split the savings" ($75/MW-day) or any other price < $100, > $50 would work

((And any IA gain "clawback" rules would likely lead to more such bilateral transactions …

- And any bilateral transaction price reporting requirements to support clawback provisions would likely lead to … Does PJM want to be in this business??))

Example 4: Uncertainty about Avoided Cost

- Now suppose at time of BRA, our market participant is somewhat unsure about his avoided cost to provide capacity in the DY three years into the future
  - A generator overall confident of unit performance, but with some risk of a failure of some major component in the meanwhile
  - An industrial company confident of ability to provide demand response, but with some risk that a facility will be out of business, or running flat out, in three years
- For purpose of example, suppose 90% chance of $100/MW-day and 10% chance of $800/MW-day avoided cost

(Note that to an economist, or to a businessman, “physically unable” is not clearly distinguishable from “able, but only at a high cost”)

Example 4: Uncertain Avoided Cost, cont'd

- Markets will be most efficient if, when costs are uncertain, sellers can offer based on what they expect their cost most likely will be, and adjust commitments if their cost turns out differently
- In our example: Offer at $100/MW-day in BRA, offer to buy back commitment at $800/MW-day if cost turns out to be $800/MW-day
  - As opposed to: only offer capacity at a price at which you are sure you can deliver (in the example, offer at maximum possible cost, $800/MW-day)
  - As opposed to: no opportunity to adjust commitment, so make sure fulfilling it will be profitable in expectation (in the example, offer at expected cost, $170/MW-day, or higher if risk-averse, and deliver even if cost is higher)
  - These outcomes are less efficient and raise prices and costs

Example 5: Asymmetric Risks of Buyback Cost

- In normal market situations, we expect future prices to be close to current prices for any commodity
  - Suggests ability to transact at “fair market value” at any time
  - Price differences should reflect changes in market conditions that earlier prices failed to anticipate; might go up or down; no systematic “asymmetry” other than the time value of money
- Such circumstances support competitive, avoided cost offers into forward markets
- Any asymmetries (such as predictable price movements, or taxes that apply only to price differentials in one direction, etc.) distort incentives to offer at avoided cost in forward markets (due to asymmetric risks)

Example 5: Asymmetric Risks: Numerical Example

Suppose a capacity seller is cleared in the BRA for $150/MW-day but now has become physically unable to deliver, must buy out

Suppose further the IA price is uncertain but expected value = BRA price (50/50 it could be $50 or $250/MW-day)

Seller buys out of obligation, is made whole in expectation (may be $100 loss or $100 gain /MW-day depending upon IA price outcome)

If instead there is a 50% tax on difference between BRA and IA prices if there's a gain, the seller will now incur $25/MW-day expected loss (.5 x -$100 + .5 x +$100 x .5 tax)

The asymmetric risk will lead him to offer above avoided cost in BRA.

Example 6: Product Type "Upgrades" in IAs

- Demand Response providers cleared as Limited DR in the BRA can "upgrade" to providing Annual DR (or ES DR) in the IAs
  - Offer to buy back Limited DR commitment at avoided cost, and…
  - Re-offer to provide either Limited DR or Annual DR, with linked bids reflecting how much of a price differential is needed to make providing Annual DR worthwhile (as in BRA)
- If for some reason there is a strong need for Annual capacity in the IA, the Annual/Limited price differential will widen, and our participant's offer to provide Annual service will clear
- This helps reliability and markets by providing ability to shift Limited DR to Annual if conditions change and PJM or a market participant has a need for additional Annual capacity

Takeaways

- Incremental auctions contribute to RPM efficiency by providing opportunities to adjust commitments if circumstances change
  - Participants' circumstances: cost to provide capacity, increased ability to provide capacity after BRA, etc.
  - Market circumstances: supply/demand/value of capacity, change in load forecast, increased need for higher quality products, etc.
- When market participants offer their capacity into IAs at avoided cost (offering to sell if uncommitted, or to buy back if already committed) this contributes to market efficiency by:
  - Ensuring that lowest cost providers are the ones who will provide capacity
  - Contributing to price convergence between BRA and IA markets
  - Creating opportunities for lower cost resources that come available after BRA
  - Allowing product type upgrades if there is an increased need for higher quality products

Takeaways, cont'd

- Note that only market participants with significant avoided costs will find it useful to offer to buy back a commitment in an IA; if avoided cost is very low the offer would never clear
  - For most existing generation avoided cost is very low, while for nearly all demand response providers the avoided cost to provide capacity and commit to reductions is significant
  - This may go a long way toward explaining why DR offers to buy back, and buys back, in IAs at a higher rate than generation
- Interference with the normal, competitive buying and selling of commitments in IAs will distort markets and lead to inefficiencies
  - If there is still some predictable bias in IA/BRA price differentials (questionable; discussed in other education items) we should prefer to identify and treat the root causes not symptoms