

Perspective on Calculating Flexible Capacity Availability Adder (FRACMOO Proposal, Draft 4, §8.1.5)

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Summary

- *Question:* What is appropriate penalty (“flexible capacity adder”) for unavailability of FRA?
- *Proposed principle:* Penalty for unavailability of a FRA unit should reflect difference between:
 - Its value to entire market (social value)
 - Its foregone revenuesI.e., align private incentive with social benefits
- If there is “missing money”, this difference (and long run capacity prices) > 0
 - *Bottom line:* unavailable unit already loses flexiramp & energy revenues \rightarrow penalty should be prorated FRA and RA revenue

Simple Example: Assumptions

- Besides energy, 3 requirements:
 - Short run flexiramp: X^* MW (17 hr/day)
 - FRA: Y^* MW (17 hr/day)
 - RA: X^* MW (5 hr/day)
- Prices: P_X, P_Y, P_Z \$/MW/hr
- Two capacity types:
 - *Flexible*: A (MW):
 - capital cost C_A (\$/MW/day)
 - Gross margin from energy market $GM_A(A,B)$ (\$/MW/day) (depends on amounts of capacity)
 - *Inflexible*: B (MW):
 - capital cost C_B (\$/MW/day)
 - Gross margin from energy market $GM_B(A,B)$ (\$/MW/day)
- Each MW of A has probability ϕ of being called upon for flexiramp

What Do Equilibrium Prices Look Like?

- Assume flexible capacity sufficiently more costly:

$$C_A - C_B > GM_A(A,B) - GM_B(A,B)$$

Its higher gross margin doesn't compensate for its greater capacity cost

- Then in order for there to be investment, prices must satisfy:

- *A covers costs:* $C_A - GM_A(A,B) = 17\phi P_X + 17 P_Y + 5P_Z$

(Cost of new entry = FlexYiramp + Capacity Revenues)

- *B:* $C_B - GM_B(A,B) = 5P_Z$

- Note: A needs to earn enough revenue from flexiramp and FRA markets, but that's not enough info to determine P_X , P_Y

- If $\phi > X^*/Y^*$, then more flexiramp than needed ($\rightarrow P_X = 0$)

- If $\phi < X^*/Y^*$, then more FRA than needed ($\rightarrow P_Y = 0$)

What Should the Penalty Be?

- Say a 1 MW flexible plant is unavailable M% of time:
 - Its financial loss (if no penalty)
$$= (M/100) [GM_A(A,B) + 17\phi P_X]$$
 - Loss of market efficiency:
$$= (M/100) [GM_A(A,B) + 17\phi P_X + 17 P_Y + 5P_Z]$$

Difference is capacity payment

- Align private incentives and long run social costs by prorating capacity payment, *not* by paying a penalty related to short-run flexiramp prices

Upshots

1. FRA availability adder = difference between value to market as whole, and private value → in long run, the price of capacity, not short run market prices
 - *Advantage*: Don't worry about whether to average flexiramp price over just constrained hours, or all hours
 - *Disadvantage*: Need transparent FRA and RA prices
2. $C_A - C_B \leq GM_A(A,B) - GM_A(A,B)$
 - flexiramp, FRA prices =0, as flex capacity earns enough from energy market
3. Perhaps like ISO-NE, base penalty on whether or not capacity unavailable on days actually needed, or other index of need?
 - I.e., don't penalize if short run market exhibits no shortage of ramp
 - Forfeit capacity payment if ramp short, considering total # shortage hours
4. Adder (rather than bucket) method consistent with framework
5. No reason for dead band. Should provide same incentive to all sources of capacity to be available