

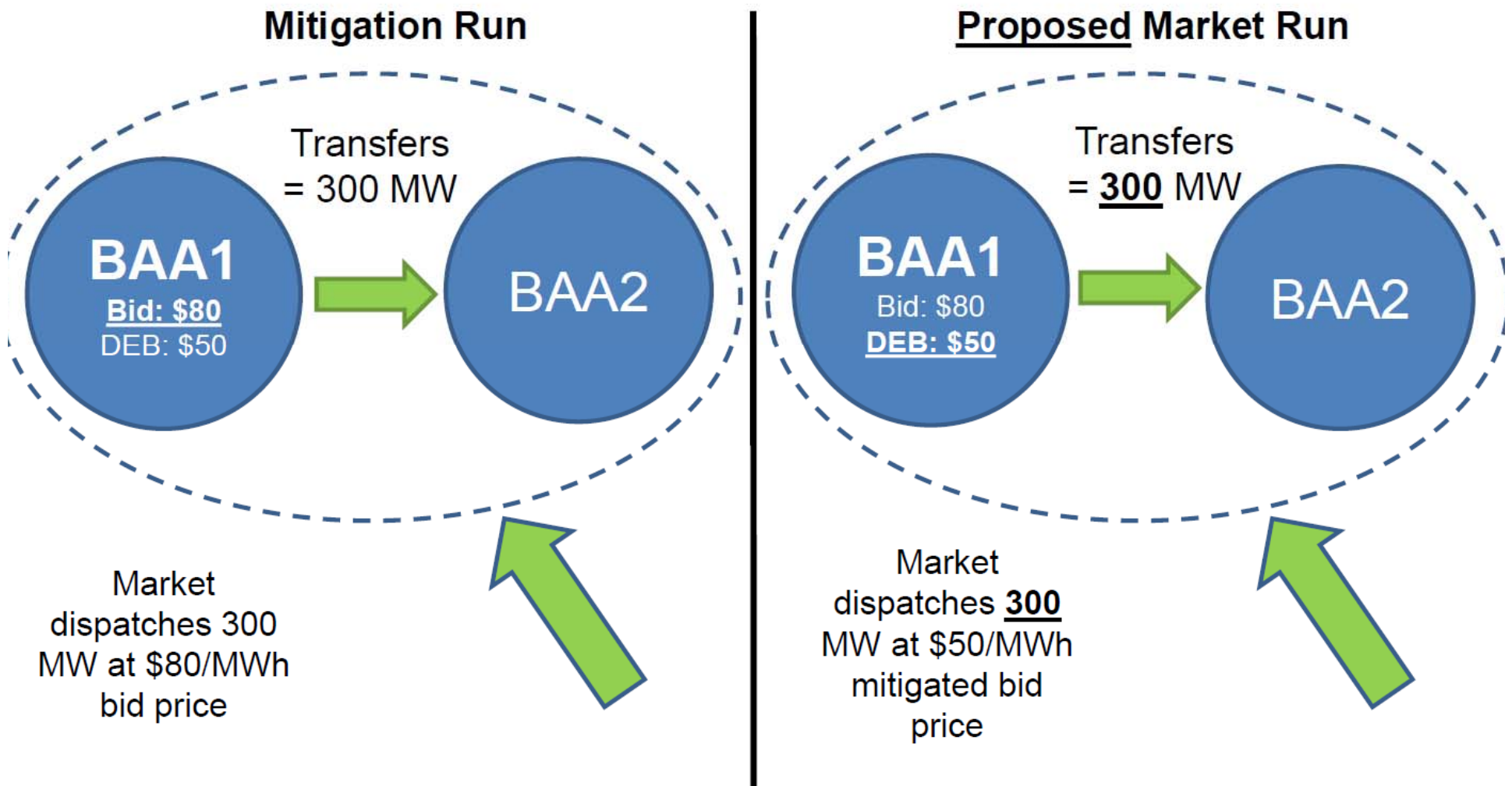
Multiple Sets of Prices from Transfer Limits to Prevent Economic Displacement: Should We Care?

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Disclaimer: Any opinions or errors are my responsibility alone

Economic Displacement – Proposed Rule



Degeneracy

= Multiple Dual Solutions (Prices) for a Given Schedule
2 BAA Example (Slides 5,7)

➤ Assumptions:

- Load1 = 0 MW; Load2 = 1000 MW
- Supply:
 - BAA1: 1000 MW (MC = \$50, Bid = \$80)
 - BAA2: 500 MW @ \$0; 200 MW @\$70; 300 MW @\$100
- Result is solutions on Slides 5,7

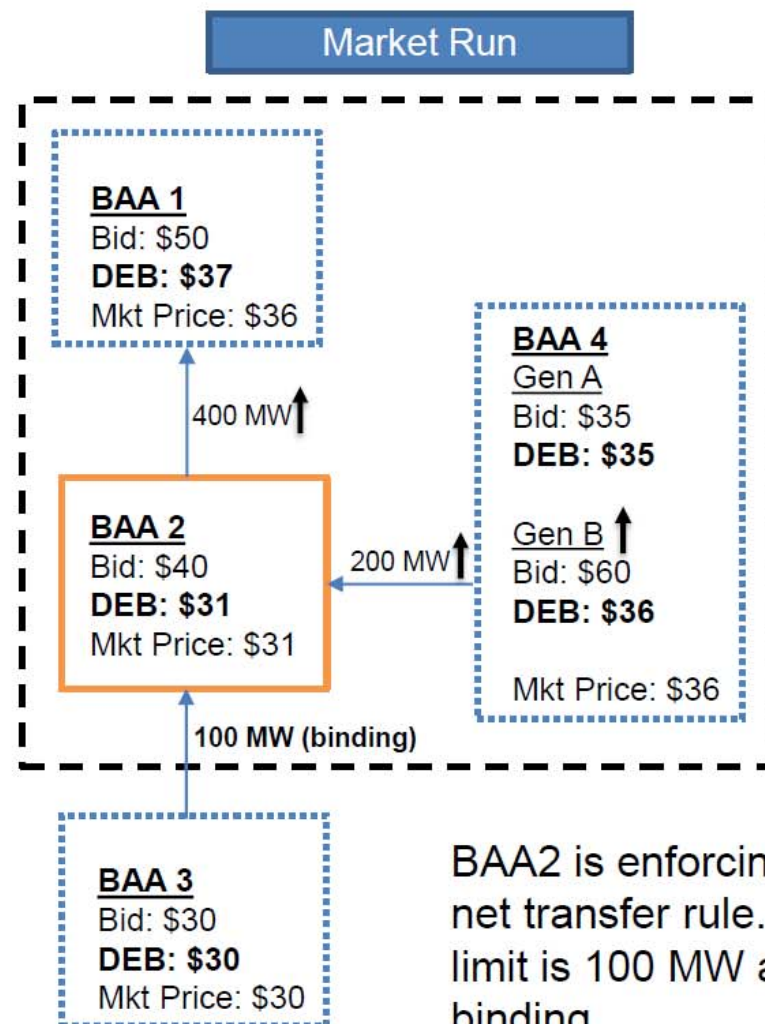
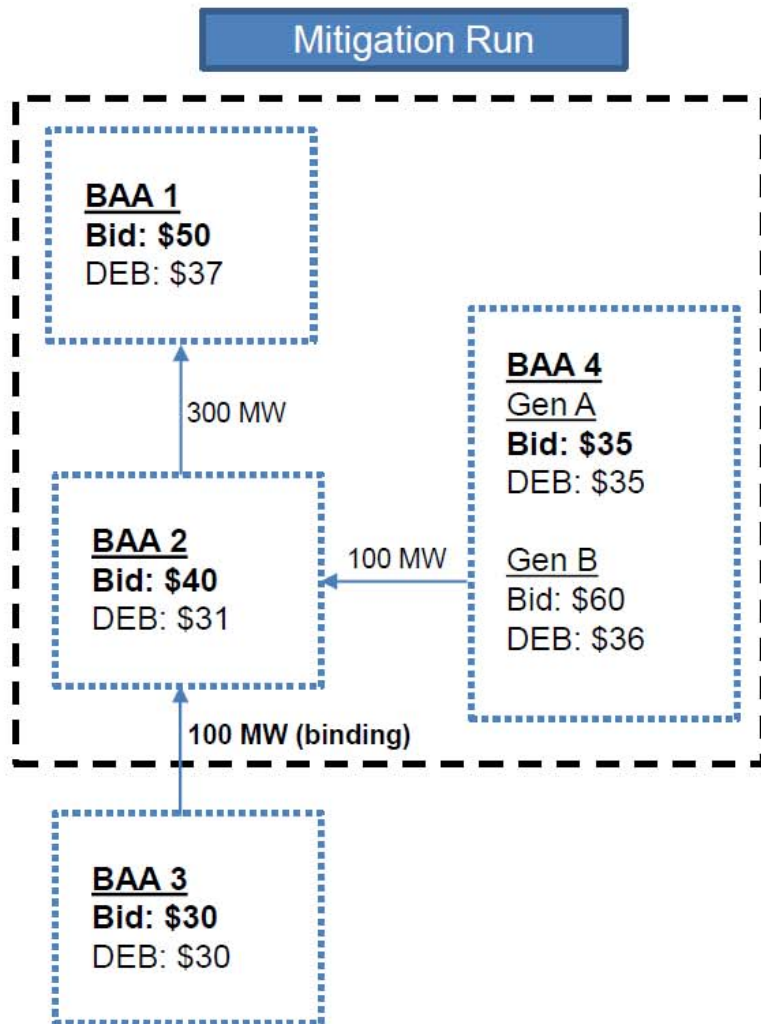
➤ There are ≥ 2 dual solutions consistent with Slide 7 Market Run:

- Solution 1: $P1 = \$50$, $P2 = \$70$, Transfer Shadow Price = \$20
- Solution 2: $P1 = \$50$, $P2 = \$100$, Transfer Shadow Price = \$50
- Or any convex combination of those two

➤ Solution 1 results if Transfers limited to 300 MW + ϵ

- Which is preferable?

Economic Displacement – Proposed Rule with 4 BAAs



BAA2 is enforcing the net transfer rule. The limit is 100 MW and binding

Degeneracy

= Multiple Dual Solutions (Prices) for a Given Schedule
4 BAA Example (Slide 9; DMM)

➤ Assumptions:

- Load1 = 400 MW; Load2 = Load3 = Load4 = 500 MW
- Supply:
 - BAA1: 100 MW @(MC = \$37, Bid = \$50)
 - BAA2: 600 MW @(MC = \$31, Bid = \$40)
 - BAA3: 700 MW @(MC = \$30, Bid = \$30)
 - BAA4: 600 MW @(MC = \$35, Bid = \$35), 600 MW @(MC = \$36, Bid = \$60)
- Limit between BAA2 and BAA3 = 100 MW
- Result is solutions on Slide 9

➤ There are ≥ 2 dual solutions consistent with Slide 9 Market Run:

- Solution 1: P1 = \$36, P2 = \$36, P3 = \$30, P4 = \$36; Transfer Shadow Price = \$0
 - BAA2 Consumers pay $36 \cdot 500 = \$18,000$
- Solution 2: P1 = \$36, P2 = \$31, P3 = \$30, P4 = \$36; Transfer Shadow Price = \$5 (Slide 9)
 - BAA2 Consumers pay $31 \cdot 500 - 5 \cdot 100 = \$15,000$
- Or any convex combination of those two

➤ Solution 1 results if Transfers from BAA2 limited to 100 MW + ϵ

- Which is preferable?

Summary & Proposal

- Degeneracy highly likely if transfer/economic displacement constraint set precisely equal to Mitigation Run transfer
 - Result: Multiple prices & wealth transfers
- Solution: 'Permute' the transfer/economic displacement constraint upwards
 - Standard mathematical method to remove degeneracy → unique dual solution
 - Results in lower shadow price, less distortion of LMPs
 - LMPs more predictable