CRR Settlement Rule Under Convergence Bidding

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Background

- Other ISO's with virtual nodal bidding have tariff provisions to deter use of virtual bids to increase CRR revenues
  - PJM and ISO-NE ("Claw back" rule for CRR revenues)
  - MISO
    - More general authority to suspend trading that contributes to price divergence between DA and real time.
    - All ISO may also refer behavior to FERC that they believe constitutes potential "market manipulation"
- CRR "gaming" concern not hypothetical
  - Despite confidential nature of most information on this issue, cases are know to have occurred.

Initial DMM Recommendations under Nodal Convergence Bidding

- Automated CRR "clawback" rule
  - Variation of PJM approach that DMM believes will be more targeted based on specific flows and congestion prices.
  - Specific variations and thresholds need further discussion/input.
- Other proposed features that may limit gaming of CRRs via virtual bidding:
  - Position limits (10%)
  - Tariff authority to quickly limit or suspend VB's that are creating significant price divergence.
  - Ability to refer behavior that may constitute potential "market manipulation" to FERC

Review of DMM's Understanding of PJM/ISO-NE Approach

- Step 1:

  $(CLMP_{DA, CRR\ Sink} - CLMP_{DA, CRR\ Source}) - (CLMP_{RT, CRR\ Sink} - CLMP_{RT, CRR, Source}) > 0?$

- Step 2:
  - Determine critical constraints based on shift factors (PTDF) of CRR source/sink relative to constraint
  - $PTDF_{CRR, Source} > 0$ and $PTDF_{CRR, Sink} < 0$?
  - $Abs(PTDF_{CRR, Sink} – PTDF_{CRR, Source}) > .10$?

	Shadow Price	Shift Factors			Subject to CRR Rule?	CLMP		
		Source	Sink	Difference		Source	Sink	Difference
		A	B	abs(B - A)		A	B	B – A
Constraint 1	$100	**.3**	**-.3**	**.6**	**Yes**	-$30	$30	$60
Constraint 2	$200	**.9**	**.5**	.4	**No**	-$180	-$100	$80
Constraint 3	$100	**-.5**	**-.9**	.4	**No**	$50	$90	$40
Constraint 4	$100	.02	-.06	**.08**	**No**	-$2	$6	$8
					Totals	-$162	$26	$188

Note: Illustrative example of PJM approach based on DMM's Aug 18, 2009 whitepaper on options for CRR Settlement Rule.

PJM/ISO-NE Approach – Step 3

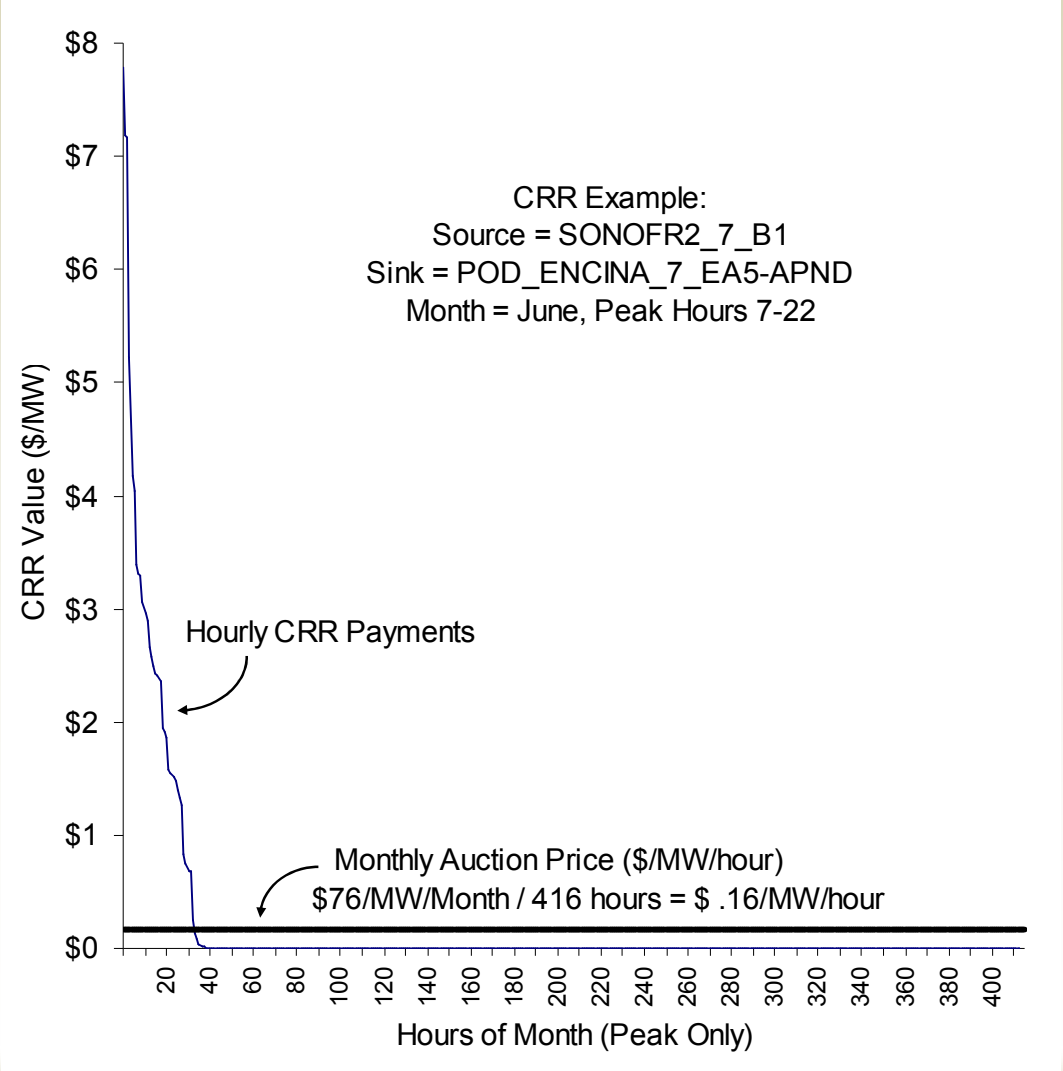
- Step 3: Identify CRR holders accepted VB at "nearby nodes"
  - Threshold = .75

Bid Type	Node	Shift Factor
Virtual Supply	J	.7
Virtual Supply	K	.6
Virtual Supply	L	.5
	$A_{Maximum}$ =	.7

Bid Type	Node	Shift Factor
Virtual Demand	X	- .1
Virtual Demand	Y	- .04
Virtual Demand	Z	- .03
	$B_{Minimum}$ =	-.1
	$A_{Maximum} - B_{Minimum}$ =	.8

PJM/ISO-NE Approach – Step 4

- Step 4:
- Limit CRR Payment to Average Auction Price for CRR ($/MW/hour)
- Not applied to "counterflow CRRs" ?
- e.g. If VB decreases or avoids congestion, no increased charge to holder of CRR in opposite flow of reduced/avoided congestion.



Alternative Approach Proposed by DMM - Step 1

- Same as PJM/NE Approach

$CLMP_{DA,Sink}$	\$51
$CLMP_{DA,Source}$	-\$9
ΔN_{DA}	\$60
$CLMP_{RT,Sink}$	\$34
$CLMP_{RT,Source}$	-\$6
ΔN_{RT}	\$40
$dL_1 = \Delta N_{DA} - \Delta N_{RT} =$	\$20
$\Delta N_{DA} > \Delta N_{RT}$?	Yes

- Real time prices used to screen CRRs with source/sink at interties based on HASP prices.
- Potential variation proposed by SCE would apply screen based on prices at CRR source/sink over entire time period of CRR (e.g. all peak hours during calendar month of CRR auction)

Note: Illustrative examples of proposed approach in slides based on Example 1 (p.6) of DMM's Sept. 14, 2009 whitepaper on Draft Proposal for CRR Settlement Rule.

Alternative Approach Proposed by DMM - Step 2

- Quantify contribution of each constraint to difference in CLMPs at CRR source/sink.

	Constraint 1	Constraint 2	Constraint 3
$CLMP_{DA,Sink}$	$30	$15	$6
$CLMP_{DA,Source}$	-$15	-$3	$9
ΔC_{DA}	$45	$18	-$3
$CLMP_{RT,Sink}$	$20	$10	$4
$CLMP_{RT,Source}$	-$10	-$2	$6
ΔC_{RT}	$30	$12	-$2
$dL_2 = \Delta C_{DA} - \Delta C_{RT} =$	$15	$6	-$1

Alternative Approach Proposed by DMM - Step 3

- Quantify impact of CRR holder's accepted VB on flows of each constraint (k) in DA market.

	Constraint 1	Constraint 2	Constraint 3
$F_{DA, k, i}$	150 MW	50 MW	50 MW

- Option: Could exclude accepted VB at LAP and Gen Hub level since it may be very difficult to profitably increase CRR payments from such bids.

Alternative Approach Proposed by DMM - Step 4

- Determine if CRR holder's VB impacted flows more than x% (L) of constraint's total limit (K).

	Constraint 1	Constraint 2	Constraint 3
$F_{DA, k}$	1,000 MW	1,000 MW	400 MW
K	1,000 MW	1,000 MW	400 MW
L	.10	.10	.10
$(K \times L) + (K - F_{DA, k, i})$	100 MW	100 MW	40 MW
$\lvert F_{DA, k, i} \rvert$	150 MW	50 MW	50 MW
$\lvert F_{DA,k,i} \rvert > (K \times L) + (K - FDA,k,i)$?	Yes	No	Yes

- Threshold parameter (L) may be set at initial value (e.g. 10%) and may be modified, if appropriate, on constraint-by-constraint basis depending on level of VB flow that may tend to create significant impact on shadow price.

Alternative Approach Proposed by DMM - Step 5

	Constraint 1	Constraint 2	Constraint 3
Step 2			
$dL_2 = \Delta C_{DA} - \Delta C_{RT}$ =	$15	$6	-$1
Step 3	Constraint 1	Constraint 2	Constraint 3
$F_{DA, k, i}$	150 MW	50 MW	50 MW
Step 4			
$F_{DA, k}$	1,000 MW	1,000 MW	400 MW
K	1,000 MW	1,000 MW	400 MW
L	.10	.10	.10
$(K \times L) + (K - F_{DA, k, i})$	100 MW	100 MW	40 MW
$\lvert F_{DA, k, i} \rvert$	150 MW	50 MW	50 MW
$\lvert F_{DA,k,i} \rvert > (K \times L) + (K - FDA,k,i)$?	Yes	No	Yes
Step 5			
CRR Payment Adjustment $[\min(-dL_2, 0)]$	($15)	$0	$0
Total CRR Payment Adjustment $[\max(\min(-dL_1, 0), \Sigma(\min(-dL_2, 0)))]$	($15)		

Other Issues/Options

- If same formulas applied to “counterflow” CRRs, owners could be required to pay more than actual CRR congestion costs.
  - See Example 2 (p.6) of DMM’s Sept. 14, 2009 whitepaper on Draft Proposal for CRR Settlement Rule.
- Should adjustments be applied only if net value of CRR in IFM > RT when summed over multiple CRR hours (SCE, WPTF)?
  - e.g. perform Step 1 screening based on summation over CRR hours in month? day?
- Application of CRR rule for affiliated SCs
  - Exclusion for affiliates subject to verifiable regulatory affiliate rules (e.g. IOUs and unregulated subsidiaries)?

Counterflow Example – Step 1

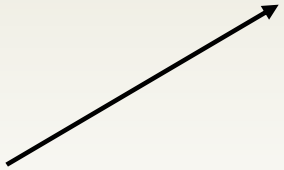
- See Example 2 (p.6) of DMM's Sept. 14, 2009 whitepaper on Draft Proposal for CRR Settlement Rule.

Step 1	
$CLMP_{DA,Sink}$	-$1
$CLMP_{DA,Source}$	$18
ΔN_{DA}	-$19
$CLMP_{RT,Sink}$	-$7
$CLMP_{RT,Source}$	$56
ΔN_{RT}	-$63
$d L_1 = \Delta N_{DA} - \Delta N_{RT} =$	$44
$\Delta N_{DA} > \Delta N_{RT}$?	Yes

Counterflow Example – Step 2

Step 2

	Constraint 1	Constraint 2	Constraint 3
$CLMP_{DA,Sink}$	$0	-$5	$4
$CLMP_{DA,Source}$	$0	$15	$3
ΔC_{DA}	$0	-$20	$1
$CLMP_{RT,Sink}$	-$5	-$10	$8
$CLMP_{RT,Source}$	$20	$30	$6
ΔC_{RT}	-$25	-$40	$2
$dL_2 = \Delta C_{DA} - \Delta C_{RT}$ =	$25	$20	-$1



CRR holder may have avoided $25/MW in CRR payment obligation by preventing congestion in IFM via VB.

Counterflow Example – Steps 3 through 5

	Constraint 1	Constraint 2	Constraint 3
Step 2			
$dL_2 = \Delta C_{DA} - \Delta C_{RT}$ =	$25	$20	-$1
Step 3			
$F_{DA, k, i}$	-150 MW	-50 MW	-50 MW
Step 4			
$F_{DA, k}$	980 MW	1,000 MW	400 MW
K	1,000 MW	1,000 MW	400 MW
L	.10	.10	.10
$(K \times L) + (K - F_{DA, k, i})$	120 MW	100 MW	40 MW
$\lvert F_{DA, k, i} \rvert$	150 MW	50 MW	50 MW
$\lvert F_{DA,k,i} \rvert > (K \times L) + (K - FDA,k,i)$?	Yes	No	Yes
Step 5			
CRR Payment Adjustment $[\min(-dL_2, 0)]$	($25)	$0	$0
Total CRR Payment Adjustment $[\max(\min(-dL_1, 0), \Sigma(\min(-dL_2, 0)))]$	($25)		

CRR holders VB avoided congestion in IFM by reducing flow 150 MW (15% of constraint limit)