

Effect of Product Substitution on MCPs

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- Synchronized Reserve Market
 - Synchronized Reserves in MAD can be used to satisfy the RTO requirement (locational substitution)
 - Price is always greater than or equal to the Non-Synchronized Reserve Price
- Non-Synchronized Reserve Market
 - Used to procure the balance of the Primary Reserve requirement that is not being met with Synchronized Reserve
 - Synchronized Reserve can be used in place of Non-Synchronized Reserve to meet the Primary Reserve requirement (product substitution)
 - **Whichever is more economic will be assigned**
 - Non-Synchronized Reserves in MAD can be used to satisfy the RTO Primary Reserve requirement (locational substitution)
 - Price is always less than or equal to the Synch Reserve price

- The Non-Synchronized Reserve Market Clearing Price (NSRMCP) represents the cost to serve an additional MW of Primary Reserves in the RTO or MAD reserve zone
- NSRMCP is calculated based on (either)
 - Synchronized Reserve Market Clearing Price when extra Tier2 MW is used to satisfy the Primary Reserve requirement
 - Lost opportunity cost from revenue forgone from not providing energy for a Non-Synchronized Reserve resource

- The NSRMCP will only be greater than \$0 under the following scenarios
 - 10-minute Synchronizing Reserves is substituted at a positive cost
 - 10-minute non-synchronized resources are being held off-line at a cost
 - when the system is short Primary Reserves and the penalty factor is setting the clearing price
- During shortage conditions, the NSRMCP will equal the Primary Reserve penalty factor



Example 1 – NSR w/ no LOC used to meet remainder of PR requirement

Resource	Status	Offer (MW)	Offer (\$)	LOC (\$)	Effective Cost (\$) (LOC + Offer)	Assignment
A	Online	10	2	4	6	10 MW SR
B	Online	10	7.5	5	12.5	
C	Offline	10	0	12	12	
D	Offline	10	0	15	15	
E	Online	10	3	0	3	10 MW SR
F	Offline	10	0	0	0	10 MW PR
G	Online	10	0	10	10	

SR Requirement	20	PR Requirement	30
SRMCP	\$6	NSRMCP	\$0

Example 2 – NSR w/ LOC used to meet remainder of PR requirement

Resource	Status	Offer (MW)	Offer (\$)	LOC (\$)	Effective Cost (\$) (LOC + Offer)	Assignment
A	Online	10	2	4	6	10 MW SR
B	Online	10	7.5	5	12.5	
C	Offline	10	0	12	12	
D	Offline	10	0	15	15	
E	Online	10	3	0	3	10 MW SR
F	Offline	10	0	5	5	10 MW PR
G	Online	10	0	10	10	

SR Requirement	20	PR Requirement	30
SRMCP	\$6	NSRMCP	\$5

Example 3 – Additional SR committed to meet PR requirement

Resource	Status	Offer (MW)	Offer (\$)	LOC (\$)	Effective Cost (\$) (LOC + Offer)	Assignment
A	Online	10	2	4	6	10 MW SR
B	Online	10	7.5	5	12.5	
C	Offline	10	0	12	12	
D	Offline	10	0	15	15	
E	Online	10	3	0	3	10 MW SR
F	Offline	10	0	18	18	
G	Online	10	0	10	10	10 MW PR

SR Requirement	20	PR Requirement	30
SRMCP	\$10	NSRMCP	\$10

Unit G sets the SRMCP and NSRMCP