Flexible Resources Energy LOC

MIC

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Flexible Resources Definition

- **“Flexible Resource” shall mean a generating resource that must have a combined Start-up Time and Notification Time of less than or equal to two hours; and a Minimum Run Time of less than or equal to two hours.**
- **This is known as the 2x2 parameter criteria.**

Flexible Resources

- **Flexible Resources are not assumed to run in real time for their entire day ahead schedule. Instead, Flexible Resources remain offline until committed by PJM in real time or self scheduled.**
- **If not committed by PJM in real time, Flexible Resources are eligible to receive Lost Opportunity Cost (LOC) Credits to cover losses in excess of DA revenues from DA buy back and/or forgone profits.**

Flexible Resources Energy LOC

- **Flexible Resources are generators eligible to be called on in real time that have a two hour or less time to start and a two hour or less minimum run time.**
- **Flexible Resources are paid LOC when not committed by PJM while having a DA award.***
- **The LOC equals the higher of:**
  A. **DA MW x (RT LMP – DA LMP)**
  B. **DA MW x (RT LMP – Offer **)**

*** Only the subset of Flexible Resources that are not expected to run in real-time unless called by PJM are eligible for this LOC credit (e.g. CTs).**

**** The offer equals the area under the incremental offer curve plus no load cost plus start cost (if the unit does not start during any hour of the DA award).**

Flexible Resources Energy LOC

- The LOC compensation preserves Flexible Resources' DA net revenue when not committed by PJM.
- When the resource does not run, it incurs a buy back cost (negative balancing revenues).
  - The buy back results in a loss when RT LMP is greater than DA LMP.
  - The buy back only results in an LOC when the RT LMP is greater than the unit's offer.

LOC Example

- **Unit clears DA for four hours.**
- **Unit Offer:**

Incremental Offer (Stepped Curve)

MW	Price ($/MWh)	Area Under Curve
50	25	$1,250
100	30	$2,750
150	55	$5,500

No Load Cost ($/hour)	$800
Start Cost ($/start)	$1,000

LOC Example 1

- Unit is not committed by PJM.
- RT LMP = DA LMP.
- Unit is expected to make $7,300.
- Because it did not run:
  - It incurs a buy back of $28,000
  - Without LOC, the unit net revenue would be zero = $28,000 (DA Rev) - $28,000 (Bal Rev)
- The LOC makes the unit whole to its DA net revenue ($7,300).

Hour	14	15	16	17	
DA LMP ($/MWh)	50	50	60	60	
DA Generation (MWh)	100	100	150	150	
RT LMP ($/MWh)	50	50	60	60	
RT Generation (MWh)	0	0	0	0	
Commitment Status	Offline	Offline	Offline	Offline	
Day-Ahead					**Total**
DA Revenues	$5,000	$5,000	$9,000	$9,000	$28,000
DA Incremental Offer	$2,750	$2,750	$5,500	$5,500	$16,500
DA No Load Cost	$800	$800	$800	$800	$3,200
DA Start Cost	$250	$250	$250	$250	$1,000
DA Net Revenue	$1,200	$1,200	$2,450	$2,450	$7,300
Real-Time / Balancing					**Total**
Balancing Revenues	($5,000)	($5,000)	($9,000)	($9,000)	($28,000)
LOC Credit (A)	$0	$0	$0	$0	
LOC Credit (B)	$1,200	$1,200	$2,450	$2,450	
LOC Credit	$1,200	$1,200	$2,450	$2,450	$7,300
RT Incremental Offer	$0	$0	$0	$0	$0
RT No Load Cost	$0	$0	$0	$0	$0
RT Start Cost	$0	$0	$0	$0	$0
					Total
Net Revenue	$1,200	$1,200	$2,450	$2,450	$7,300
				BOR Credit	$0

LOC Example 2

- Unit is not committed by PJM.
- RT LMP > DA LMP.
- Unit is expected to make $7,300.
- Because it did not run:
  - It incurs a buy back of $33,000
  - Without LOC, the unit net revenue would be negative = $28,000 (DA Rev) - $33,000 (Bal Rev)
- The LOC makes the unit whole to its DA net revenue ($7,300) + buy back loss ($5,000) for a total LOC of $12,300.

Hour	**14**	**15**	**16**	**17**	
DA LMP ($/MWh)	50	50	60	60	
DA Generation (MWh)	100	100	150	150	
RT LMP ($/MWh)	60	60	70	70	
RT Generation (MWh)	0	0	0	0	
Commitment Status	Offline	Offline	Offline	Offline	
Day-Ahead					**Total**
DA Revenues	$5,000	$5,000	$9,000	$9,000	$28,000
DA Incremental Offer	$2,750	$2,750	$5,500	$5,500	$16,500
DA No Load Cost	$800	$800	$800	$800	$3,200
DA Start Cost	$250	$250	$250	$250	$1,000
DA Net Revenue	$1,200	$1,200	$2,450	$2,450	$7,300
Real-Time / Balancing					**Total**
Balancing Revenues	($6,000)	($6,000)	($10,500)	($10,500)	($33,000)
LOC Credit (A)	$1,000	$1,000	$1,500	$1,500	
LOC Credit (B)	$2,200	$2,200	$3,950	$3,950	
LOC Credit	$2,200	$2,200	$3,950	$3,950	$12,300
RT Incremental Offer	$0	$0	$0	$0	$0
RT No Load Cost	$0	$0	$0	$0	$0
RT Start Cost	$0	$0	$0	$0	$0
					Total
Net Revenue	$1,200	$1,200	$2,450	$2,450	$7,300
				BOR Credit	$0

LOC Example 3

- Unit is not committed by PJM.
- RT LMP < DA LMP.
- Unit is expected to make $7,300.
- Because it did not run:
  - It incurs a buy back of $15,000
  - Without LOC, the unit net revenue is positive = $28,000 (DA Rev) - $15,000 (Bal Rev)
- There is no need for LOC because the buy back results in a profit of $13,000. Higher than the expected DA net revenue of $7,300.

Hour	14	15	16	17	
DA LMP ($/MWh)	50	50	60	60	
DA Generation (MWh)	100	100	150	150	
RT LMP ($/MWh)	30	30	30	30	
RT Generation (MWh)	0	0	0	0	
Commitment Status	Offline	Offline	Offline	Offline	
Day-Ahead					**Total**
DA Revenues	$5,000	$5,000	$9,000	$9,000	$28,000
DA Incremental Offer	$2,750	$2,750	$5,500	$5,500	$16,500
DA No Load Cost	$800	$800	$800	$800	$3,200
DA Start Cost	$250	$250	$250	$250	$1,000
DA Net Revenue	$1,200	$1,200	$2,450	$2,450	$7,300
Real-Time / Balancing					**Total**
Balancing Revenues	($3,000)	($3,000)	($4,500)	($4,500)	($15,000)
LOC Credit (A)	($2,000)	($2,000)	($4,500)	($4,500)	
LOC Credit (B)	($800)	($800)	($2,050)	($2,050)	
LOC Credit	$0	$0	$0	$0	$0
RT Incremental Offer	$0	$0	$0	$0	$0
RT No Load Cost	$0	$0	$0	$0	$0
RT Start Cost	$0	$0	$0	$0	$0
					Total
Net Revenue	$2,000	$2,000	$4,500	$4,500	$13,000
				BOR Credit	$0

Flexible Resources LOC Application

- **PJM applies the flexible resource LOC credit calculation to any unit that clears the DAM with a schedule that meets the flexible resource criteria (i.e. 2x2).**
- **An issue occurs when units clear the DAM on a schedule that meets the 2x2 criteria but such schedule is not selected in RT.**
- **This can happen when a market seller fails the TPS test DA but does not fail in RT and the unit's price schedule does not meet the 2x2 criteria and it is not committed.**

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