

Lost Opportunity Cost in PJM

MMUAC

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Lost Opportunity Cost

- **Opportunity cost or lost opportunity cost calculations are defined in twenty seven sections of the tariff.**
- **Twenty four LOC calculations are based on the opportunity cost of not producing energy due to reliability issues or to provide ancillary services.**
 - **The other three are:**
 - **Capacity: OATT Attachment DD Reliability Pricing Model 6.7**
 - **Regulatory: OA Schedule 1 § 1.3.2B**
 - **Non-regulatory: OA Schedule 1 § 1.3.17B**



LOC Definition

- **A resource with two options, A or B (mutually exclusive), where A is more profitable than B, but B is the desired option for the system.**
- **In order to make the resource indifferent, option B must be as profitable as option A. In order to do that an LOC must be calculated.**
- **LOC = Profit of option A – Profit of option B**
- **Profit of option A = Revenues of A – Costs of A**
- **Profit of option B = Revenues of B – Costs of B**

LOC in PJM

- **The current LOC rules are inconsistent and inaccurate.**
- **The markets affected are:**
 - Energy
 - Regulation
 - Synchronized reserve
 - Non-synchronized reserve
 - Day-ahead scheduling reserve
- **The services affected are:**
 - Reactive
 - Black start
 - Synchronous condensing



Current Issues

- **Offer used (price or cost)**
- **Exclusion of no load and startup costs**
- **Full offer curve**
- **Desired or day-ahead output**
- **Real-time or day-ahead LMP**
- **Unit type eligibility**
- **Intra-hour LOC**
- **Lack of clarity in tariff**



Market / Service	Reason	Category	Resource Type	Offer Used	No Load and Startup Costs	Full Offer Curve	Desired Output	Real-Time LMP	Unit Type Eligibility	Intra-Hour LOC	Not in Tariff
Energy	Reduced / Suspended in Real Time	(1)	All Unit Types Except Wind and Hydro Units	Higher of price or cost	NA	Not Used	Used	Used	All	Not Calculated	Yes
		(1)	Wind Units	Higher of price or cost	NA	Not Used	Used	Used	Wind	Not Calculated	Yes
		(2)	Hydro Units	Peak / Off Peak LMP	NA	NA	Used	Used	Hydro	Not Calculated	Yes
	Scheduled DA Not Called RT	(3)	CTs and Diesels	Higher of price or cost	Not Included	Not Used	Not Used	Not Used	CTs and Diesels	Not Calculated	Yes
Reactive	Reduced / Suspended in Real Time	(1)	All Unit Types Except Wind and Hydro Units	Higher of price or cost	NA	Not Used	Used	Used	All	Not Calculated	Yes
		(2)	Hydro Units	Peak / Off Peak LMP	NA	NA	Used	Used	Hydro	Not Calculated	Yes
	Scheduled DA Not Called RT	(3)	CTs and Diesels	Higher of price or cost	Not Included	Not Used	Not Used	Not Used	CTs and Diesels	Not Calculated	Yes
Regulation	Regulation Price	(4)	All Resources	NA	NA	NA	NA	NA	All	NA	Yes
		(5)	All Unit Types Except Hydro Units	Lower of price or cost	NA	Not Used	Used	Used	All *	Calculated	Yes
		(2)	Hydro Units Spilling	NA	NA	NA	Used	Used	Hydro	Calculated	Yes
		(2)	Hydro Units Not Spilling with DA Scheduled Output	Peak / Off Peak LMP	NA	NA	Used	Used	Hydro	Calculated	Yes
		(2)	Hydro Units Not Spilling without DA Scheduled Output	Peak / Off Peak LMP	NA	NA	Used	Used	Hydro	Calculated	Yes
	LOC used in Settlement Regulation LOC	(5)	All Unit Types	Lower of price or cost	NA	Not Used	Used	Used	All	Calculated	Yes
Synchronized Reserves	Settlement SR LOC	(4)	All Resource Types	NA	NA	NA	NA	NA	All	NA	Yes
	SR Price	(6)	All Unit Types	Committed offer	NA	Not Used	Used	Used	All	Calculated	Yes
	LOC used in Settlement SR LOC	(6)	All Unit Types	Committed offer	NA	NA	Used	Used	All	Calculated	Yes
Non-Synchronized Reserves	Settlement NSR LOC	(4)	All Resource Types	NA	NA	NA	NA	NA	All	NA	Yes
	NSR Price	(6)	All Unit Types	Committed offer	Not Included	Not Used	Used	Used	All	Calculated	Yes
	LOC used in Settlement NSR LOC	(6)	All Unit Types	Committed offer	Not Included	Not Used	Used	Used	All	Calculated	Yes
Black Start	NA	(1)	NA	Not Defined in Tariff							
DASR	NA	(7)	NA	Not Defined in Tariff							
Synchronous Condensing	Reactive	(6)	All Unit Types	Committed offer	NA	Not Used	Used	Used	All	Not Calculated	Yes
	Post-Contingency Operation	(6)	All Unit Types	Committed offer	NA	Not Used	Used	Used	All	Not Calculated	Yes
	Not for Reactive or Synchronized Reserves	(6)	NA	Not Defined in Tariff							

* All units are eligible for intra-hour regulation LOC but only steam units are eligible for shoulder hour regulation LOC.



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