PJM Opportunity Cost Calculator – Rolling Cases

MIC Special Session

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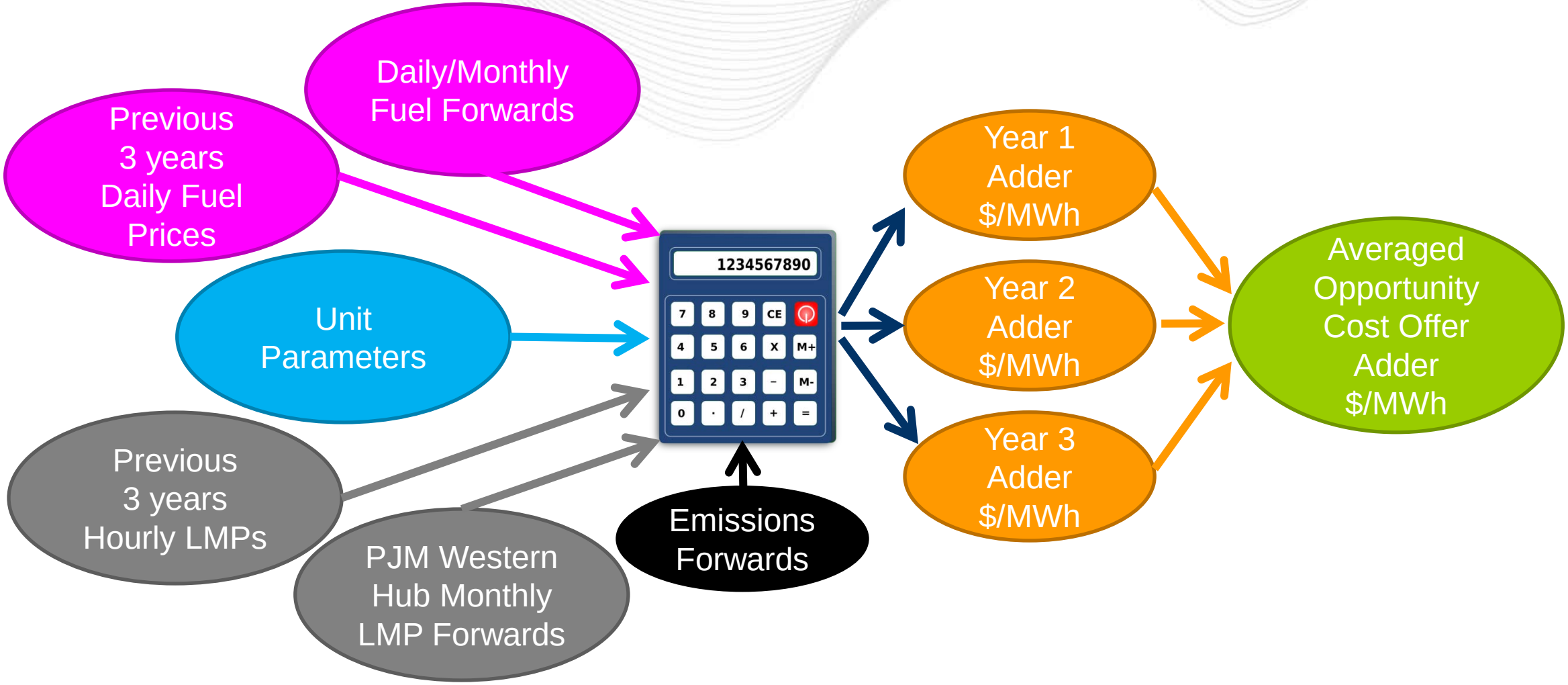
Opportunity Cost

- Opportunity Cost – when available run hours are limited, foregone profits associated with being run during one time period when it could have been more profitable to run in a higher valued time period within the same year or compliance period.

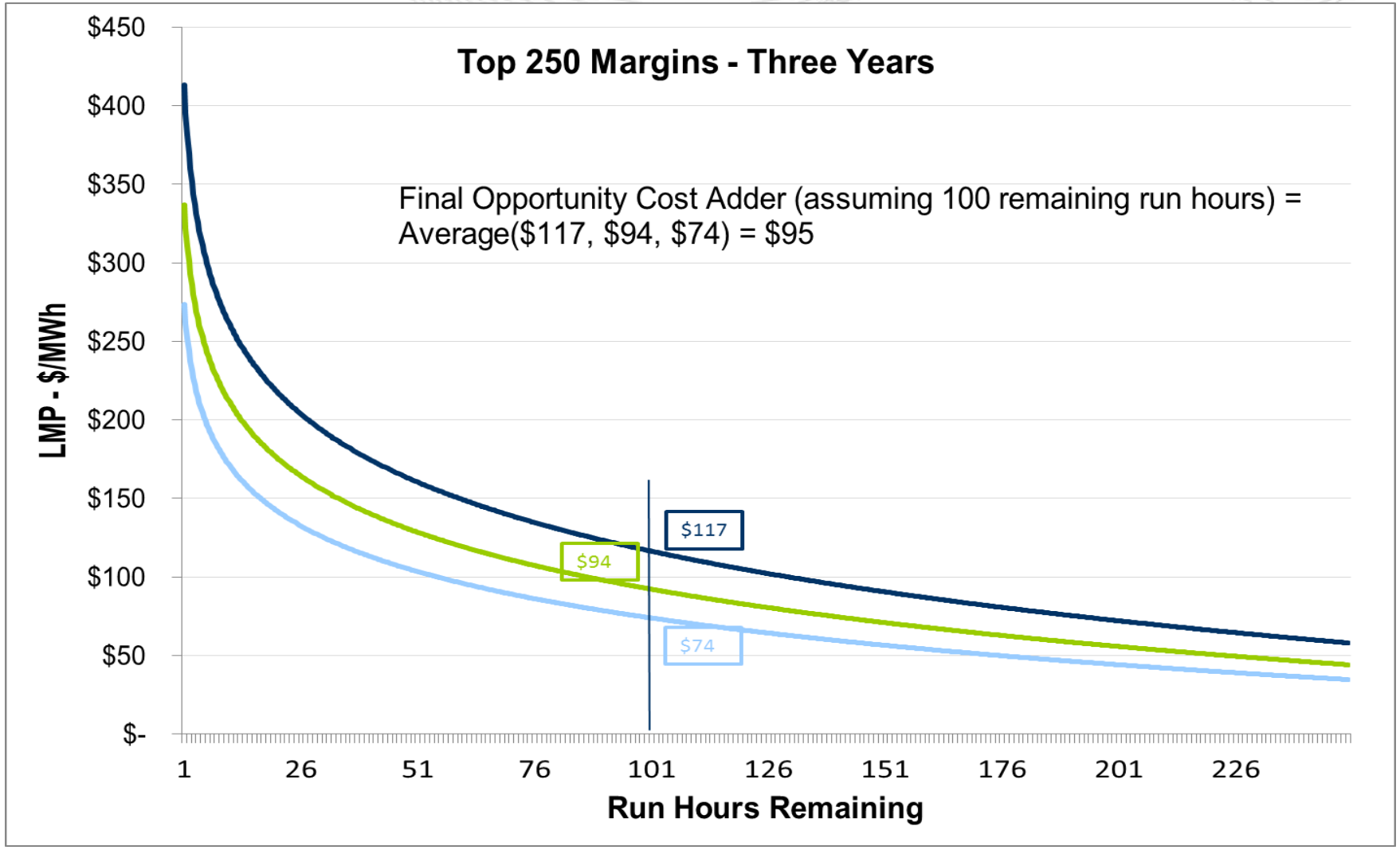
Opportunity Cost Calculator



Calculation of Margin

- Future prices are applied to the “shapes” of each of the past three years to arrive at three sets of forecasted values.
- Forecasted LMP – Forecasted Dispatch Cost = Margin
- Margins are ranked from highest to lowest, taking into account minimum run hour limitations.
- The number of remaining run hours determines the margin that will be selected.
- The final margins from the past three years are averaged to arrive at the Opportunity Cost Adder.

Margin Selection



Rolling Cases

- One of the requests from the last Opportunity Cost Calculator special session was for additional education about rolling cases and how the PJM calculator treats them.
- The PJM Opportunity Cost Calculator, in addition to calculating adders for calendar-year emissions limitations, is also able to provide adders for a rolling compliance period (e.g. a rolling 12 months) rather than a calendar year period.

Rolling Compliance Period

- In a rolling compliance period, as each new month starts, a certain amount of hours will be added back into the total pool of hours to be used.

12 month rolling compliance period
800 hours available in each period

Today

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12	FA Month 1	FA Month 2	FA Month 3	FA Month 4	FA Month 5
period 1	60	70	80	90	100	80	50	80	60	40	20	70					
period 2		70	80	90	100	80	50	80	60	40	20	70	60				
period 3			80	90	100	80	50	80	60	40	20	70	60	70			
period 4				90	100	80	50	80	60	40	20	70	60	70	80		
period 5					100	80	50	80	60	40	20	70	60	70	80	90	
period 6						80	50	80	60	40	20	70	60	70	80	90	100

Annual/Rolling Case Comparison Set-up

- Assume a year with just two months.
- Each month has only 6 hours.
- Hours are ranked by margin (LMP Forecast – Dispatch Cost Forecast), irrespective of month.

- Annual Case – Total run hour limitation of four hours.
- Rolling Case – Total run hour limitation of four hours, but a maximum of 2 hours are permitted each month.

Example #1

Month	Hour	Margin	Hour used for Annual Case?	Hour used for Rolling Case?
1	1	$100	A	R
1	2	$90	A	R
1	3	$80	A	
1	4	$70	A	
1	5	$60		
1	6	$50		
2	7	$40		R
2	8	$30		R
2	9	$20		
2	10	$10		
2	11	$0		
2	12	$-10		

Adder for Annual Case = $70
Adder for Rolling Case = $30

Example #1 – cont.

- This example represents a dispatch pattern consistent with reality/history, however, the adder produced by the rolling case will not optimize the unit's operation at the highest LMP hours.
- Thus, PJM recommends running a rolling case and a short-term case and using the higher of the two adders.
- In this example, running a short-term case for Month 1, with the two-hour run limitation, will produce a $90 adder ensuring neither the annual or monthly constraint are violated.

Example #2

Month	Hour	Margin	Hour used for Annual Case?	Hour used for Rolling Case?
1	1	$100	A	R
1	2	$90	A	R
1	3	$80	A	
2	4	$70	A	R
1	5	$60		
2	6	$50		R
1	7	$40		
2	8	$30		
1	9	$20		
2	10	$10		
2	11	$0		
2	12	$-10		

Adder for Annual Case = $70

Adder for Rolling Case = $50

Example #3

Month	Hour	Margin	Hour used for Annual Case?	Hour used for Rolling Case?
1	1	$100	A	R
2	2	$90	A	R
1	3	$80	A	R
2	4	$70	A	R
1	5	$60		
2	6	$50		
1	7	$40		
2	8	$30		
1	9	$20		
2	10	$10		
1	11	$0		
2	12	$-10		

In this case, the results of both cases should be the same → $70

Example #4

Month	Hour	Margin	Hour used for Annual Case?	Hour used for Rolling Case?
2	1	$100	A	R
2	2	$90	A	R
2	3	$80	A	R
2	4	$70	A	R
1	5	$60		
1	6	$50		
2	7	$40		
2	8	$30		
1	9	$20		
2	10	$10		
1	11	$0		
2	12	$-10		

In this case, the results of both cases should be the same → $70

However, in this case it will be the same because none of the hours originally allotted to Month 1 would have been used.

Example #5

Month	Hour	Margin	Hour used for Annual Case?	Hour used for Rolling Case?
1	1	$100	A	R
2	2	$90	A	R
2	3	$80	A	R
2	4	$70	A	R
1	5	$60		
1	6	$50		
2	7	$40		
2	8	$30		
1	9	$20		
2	10	$10		
1	11	$0		
2	12	$-10		

In this case, the results of both cases should be the same → $70

However, in this case it will be the same because only one of the hours originally allotted to Month 1 would have been used.