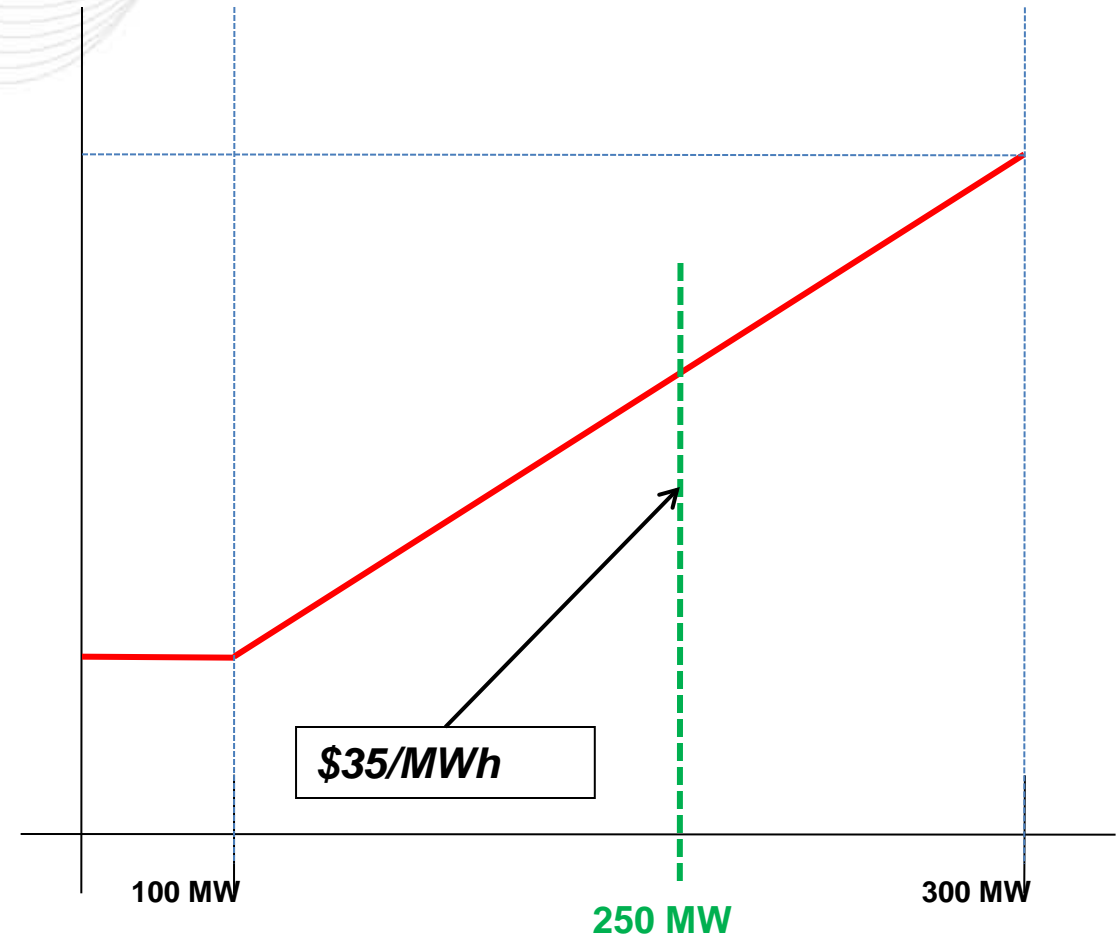


Example Calculations for PJM Matrix: *Remove DA OR*

Adam Keech

Generator: Oakmont

- Economic Max = 300 MW
- Offer Curve:
 - \$20 @ 100 MW
 - \$40 @ 300 MW
 - Slope = \$.10/MWh



- **DA LMP** = Day Ahead LMP
- **DA MW** = Day Ahead Scheduled MW
- **DA VALUE** = Day Ahead LMP * Day Ahead MW
- **DA START** = Day Ahead Startup Cost
- **DA NO LOAD** = Day Ahead Hourly No Load Cost
- **DA INC COST** = Incremental cost of generator at DA MW (area under offer curve)
- **DA OFFER** = DA Start + DA No Load + DA INC Cost

HE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTALS	
DA LMP	15	16	18	21	18	22	34	44	24	21	20	19	21	22	24	22	30	31	26	18	17	19	22	15		
DA MW	0	0	0	110	100	120	240	300	140	110	100	100	110	120	140	120	200	210	160	100	100	100	120	100		
DA VALUE	0	0	0	2310	1800	2640	8160	13200	3360	2310	2000	1900	2310	2640	3360	2640	6000	6510	4160	1800	1700	1900	2640	1500	74840	
DA START	0	0	0	20000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20000	
DA NO LOAD	0	0	0	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	10500
DA INC COST	0	0	0	2205	2000	2420	5780	8000	2880	2205	2000	2000	2205	2420	2880	2420	4500	4805	3380	2000	2000	2000	2420	2000	62520	
DA OFFER	0	0	0	22705	2500	2920	6280	8500	3380	2705	2500	2500	2705	2920	3380	2920	5000	5305	3880	2500	2500	2500	2920	2500	93020	

Currently

- $DA\ OR = \text{Min}(0, DA\ OFFER - DA\ VALUE) = \$93,020 - \$74,840 = \$18,180$
- $DA\ Credits = DA\ VALUE + DA\ OR = \$74,840 + \$18,840 = \$93,020$

- **RT LMP** = Real-Time LMP
- **RT MW** = Real-Time Scheduled MW
- **BAL VALUE** = (Real-Time MW – Day Ahead MW) * Real-Time LMP
- **FOLLOWING (Y/N)** = Following dispatch
- **RT START**= Real-Time Startup Cost
- **RT NO LOAD** = Real-Time Hourly No Load Cost
- **RT INC COST** = Incremental cost of generator at RT MW (area under offer curve)
- **RT OFFER** = Real-Time Start + Real-Time No Load + Real-Time INC Cost



Current: Balancing Settlement

HE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTALS	
RT LMP	16	14	14	29	22	31	37	48	22	20	19	19	18	21	22	21	27	33	37	28	20	16	17	19		
RT MW	0	0	49	190	120	210	270	300	120	100	100	100	100	110	120	110	170	230	270	180	100	100	100	100		
BAL VALUE	0	0	686	2320	440	2790	1110	0	-440	-200	0	0	-180	-210	-440	-210	-810	660	4070	2240	0	0	-340	0	11486	
FOLLOWING	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
RT START	0	0	20000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20000
RT NO LOAD	0	0	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	11000
RT INC COST	0	0	980	4205	2420	4805	6845	8000	2420	2000	2000	2000	2000	2205	2420	2205	3645	5445	6845	3920	2000	2000	2000	2000	72360	
RT OFFER	0	0	21480	4705	2920	5305	7345	8500	2920	2500	2500	2500	2500	2705	2920	2705	4145	5945	7345	4420	2500	2500	2500	2500	103360	

Currently

- $BOR = \text{Max}(0, RT \text{ OFFER} - BAL \text{ VALUE} - DA \text{ VALUE} - DA \text{ OR CREDITS})$

$$BOR = \$103,360 - \$11,486 - \$74,840 - \$18,180 = \text{Max}(0, -\$1,146) = \$0.00$$

- The resource is receiving a DA OR payment but not a BOR payment
 - This means the resource's "cost" in Day Ahead exceeded the credits it was paid
- The resource is not receiving a RT BOR payment
 - This indicates the credits the resource is being paid exceed its actual operating cost
- The resource is profiting from its DA OR payment by \$1,146

HE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTALS	
DA LMP	15	16	18	21	18	22	34	44	24	21	20	19	21	22	24	22	30	31	26	18	17	19	22	15		
DA MW	0	0	0	110	100	120	240	300	140	110	100	100	110	120	140	120	200	210	160	100	100	100	120	100		
DA VALUE	0	0	0	2310	1800	2640	8160	13200	3360	2310	2000	1900	2310	2640	3360	2640	6000	6510	4160	1800	1700	1900	2640	1500	74840	
DA START	0	0	0	20000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20000	
DA NO LOAD	0	0	0	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	10500
DA INC COST	0	0	0	2205	2000	2420	5780	8000	2880	2205	2000	2000	2205	2420	2880	2420	4500	4805	3380	2000	2000	2000	2420	2000	62520	
DA OFFER	0	0	0	22705	2500	2920	6280	8500	3380	2705	2500	2500	2705	2920	3380	2920	5000	5305	3880	2500	2500	2500	2920	2500	93020	

Proposed

- DA OR = \$0
- DA Credits = DA VALUE = \$74,840



Current: Balancing Settlement

HE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	TOTALS	
RT LMP	16	14	14	29	22	31	37	48	22	20	19	19	18	21	22	21	27	33	37	28	20	16	17	19		
RT MW	0	0	49	190	120	210	270	300	120	100	100	100	100	110	120	110	170	230	270	180	100	100	100	100		
BAL VALUE	0	0	686	2320	440	2790	1110	0	-440	-200	0	0	-180	-210	-440	-210	-810	660	4070	2240	0	0	-340	0	11486	
FOLLOWING	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y		
RT START	0	0	20000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20000
RT NO LOAD	0	0	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	11000
RT INC COST	0	0	980	4205	2420	4805	6845	8000	2420	2000	2000	2000	2000	2205	2420	2205	3645	5445	6845	3920	2000	2000	2000	2000	72360	
RT OFFER	0	0	21480	4705	2920	5305	7345	8500	2920	2500	2500	2500	2500	2705	2920	2705	4145	5945	7345	4420	2500	2500	2500	2500	103360	

Proposed

- $$BOR = \text{Max}(0, RT \text{ OFFER} - BAL \text{ VALUE} - DA \text{ VALUE} - \text{DA OR CREDITS})$$

$$BOR = \$103,360 - \$11,486 - \$74,840 = \text{Max}(0, \$17,034) = \$17,034$$

\$0

- Difference in settlement is the \$1,146 profit the unit originally received due to its DA OR payment
 - Original DA OR – Proposed BOR = Margin
 $\$18,180 - \$17,034 = \$1,146$
- DA OR allocated to DA Load + DECs + Exports
- BOR allocated to deviations (in this case)
- Significant shift in cost allocation (under today's rules)
 - Good thing that's on our charter!!

- IT DOES NOT CHANGE DA SCHEDULING METHODOLOGY
 - Resource parameters adhered to. Resources paid MW * MCP, ONLY.
- Removes the ability for a resource to make a profit via its DA OR payment
 - Less uplift overall
- Make whole methodology based on actual incurred costs
- Stronger incentive to follow dispatch
 - Only RT make whole exists. Not following sacrifices that.
- Costs shifted into real-time market where they are incurred
 - Currently a different allocation. Needs to be coordinated with allocation methodology changes.
- Reduction from 2 uplift buckets to allocate down to one
 - Potentially ease allocation discussions

