



## 2008/ 2009 RPM Base Residual Auction Results

### Introduction

The purpose of this document is to provide additional information for PJM stakeholders regarding the 2008/2009 Reliability Pricing Model (RPM) Base Residual Auction results. The discussion also provides a comparison of the 2008/2009 auction results to the results from the 2007/2008 RPM auction.

### 2008/ 2009 Base Residual Auction Results Discussion

*Table 1* contains a summary of the clearing prices resulting from the 2008/2009 RPM Base Residual Auction in comparison to the clearing prices from the 2007/2008 RPM Base Residual Auction. The Resource Clearing Price is the marginal clearing price that will be paid to each cleared Capacity Resource in \$ per MW day. The Final Zonal Capacity Transfer Right Credit Rate is the value of the capacity transfer capability available on the transmission system to import capacity into the constrained LDAs per MW of UCAP obligation in that zone. The Preliminary Net Load Price is the estimated price that each MW of UCAP obligation will pay in \$ per MW day. The Preliminary Net Load Price is calculated by subtracting the Final Zonal Capacity Transfer Right Credit Rate from the Resource Clearing Price in each LDA. A discussion of the factors that impacted the clearing price differences between these auctions is provided beginning on page 5 of this document.

**Table 1 – 2007/2008 and 2008/2009 RPM Base Residual Auction Pricing Results**

	RTO		EMAAC		SWMAAC	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
Resource Clearing Prices (\$/MW Day)	\$40.80	\$111.92	\$197.67	\$148.80	\$188.54	\$210.11
Capacity Transfer Right Credit Rate (\$/MW Day)	\$0	\$0	\$20.16	\$5.29	\$48.38	\$29.53
Preliminary Net Load Price (\$/MW Day)	\$40.80	\$111.92	\$177.51	\$143.51	\$140.16	\$180.58

**Mitigation** - All regions of the RTO, including the RTO as a whole have failed the Three-Pivotal Supplier Test, therefore mitigation was applied to all existing units in the execution of the RPM auction clearing.

*Table 2* contains a summary of the offer and clearing data for the 2007/2008 and 2008/2009 RPM Base Residual Auction. The summary includes all resources located in the RTO (including EMAAC and SWMAAC) and both constrained LDAs separately, and notes the capacity located outside the PJM footprint that was offered into the auction.



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**Table 2 – 2007/2008 and 2008/2009 RPM Base Residual Auction Generation and Demand Information**

	RTO*		EMAAC		SWMAAC	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
<b>Auction Supply (all values in ICAP)</b>						
Internal PJM capacity (Generation and Demand Resources)	165,111.2	166,037.9	33,024.3	33,490.4	11,546.1	11,868.6
Imports Offered	2983.8	2612.0	0.0	0.0	0.0	0.0
<b>Total Eligible RPM Capacity</b>	<b>168,095.0</b>	<b>168,649.9</b>	<b>33,024.3</b>	<b>33,490.4</b>	<b>11,546.1</b>	<b>11,868.6</b>
Exports / Delisted Capacity	4,373.9	4,205.8	0.0	0.0	0.0	0.0
FRR Commitments (internal and external capacity)	24,717.0	24,953.5	0.0	0.0	0.0	0.0
Excused	506.4	722.0	14.1	18.1	316.0	316.0
<b>Total Eligible RPM Capacity - Excused</b>	<b>29,597.3</b>	<b>29,881.3</b>	<b>14.1</b>	<b>18.1</b>	<b>316.0</b>	<b>316.0</b>
<b>Remaining Eligible RPM Capacity</b>	<b>138,497.7</b>	<b>138,768.6</b>	<b>33,010.2</b>	<b>33,472.3</b>	<b>11,230.1</b>	<b>11,552.6</b>
Generation Offered	138,369.0	138,076.7	32,900.2	33,140.3	11,211.1	11,249.1
DR Offered	123.5	691.9	43.3	332.0	19.0	303.5
<b>Total Eligible RPM Capacity Offered</b>	<b>138,492.5</b>	<b>138,768.6</b>	<b>32,943.5</b>	<b>33,472.3</b>	<b>11,230.1</b>	<b>11,552.6</b>
<b>Total Eligible RPM Capacity Unoffered</b>	<b>5.2</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>

\* RTO numbers include EMAAC and SWMAAC

A total of 168,649.9 MW of installed capacity was eligible to be offered into the Base Residual Auction. Of this eligible amount, 2,612 MW were from external resources that had fulfilled the eligibility requirements to be considered a PJM Capacity Resource. A portion of the external resource total was included in FRR Capacity Plans, and the remainder was offered into the auction.

A total of 138,768.6 MW of installed capacity was offered into the Base Residual Auction. A difference of 29,881.3 MW was eligible, but was not offered due to 1) inclusion in an FRR Capacity Plan, 2) export of the resource, or 3) having been excused from offering into the auction. Resources were excused from the must offer requirement for the following reasons: environmental restrictions, generation moving behind the meter, and ownership changes.



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Participants' sell offer EFORd values were used to translate the installed capacity values into unforced capacity (UCAP) values. In UCAP, a total of 131,880.6 MW were offered into the 2008/2009 Base Residual Auction, comprised of 131,164.8 MW of generation capacity and 715.8 MW of capacity from Demand Resources. Of those offered, a total of 129,597.6 MW of capacity was cleared in the auction. Of the cleared amount, 129,061.4 MW was from generation capacity and 536.2 MW was from Demand Resources. Capacity that was offered but not cleared in the Base Residual Auction will be eligible to offer into the Third Incremental Auction to be conducted in January 2008. *Table 3* illustrates the Generation and Demand Response Offered and Cleared translated into Unforced Capacity MW amounts.

**Table 3 – Generation and Demand Response Offered and Cleared Represented in Unforced Capacity MW**

Auction Results (all values in UCAP*)	RTO**		EMAAC		SWMAAC	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
Generation Offered	130,716.1	131,164.8	30,782.5	31,036.0	10,181.5	10,312.0
DR Offered	127.6	715.8	44.7	343.4	19.7	314.1
<b>Total Offered</b>	<b>130,843.7</b>	<b>131,880.6</b>	<b>30,827.2</b>	<b>31,379.4</b>	<b>10,201.2</b>	<b>10,626.1</b>
Generation Cleared	129,281.6	129,061.4	30,753.1	30,062.6	10,181.5	10,312.0
DR Cleared	127.6	536.2	44.7	168.7	19.7	309.2
<b>Total Cleared</b>	<b>129,409.2</b>	<b>129,597.6</b>	<b>30,797.8</b>	<b>30,231.3</b>	<b>10,201.2</b>	<b>10,621.2</b>
Uncleared	1,434.5	2,283.0	29.4	1,148.1	0.0	4.9

\* UCAP calculated using sell offer EFORd for Generation Resources. Demand Resource UCAP values were calculated using appropriate FPR and DR Factor values.

\*\* RTO numbers include EMAAC and SWMAAC

*Table 4* contains a summary of capacity additions and reductions from the 2007/2008 Base Residual Auction to the 2008/2009 Base Residual Auction. A net total of 923.5 MW of incrementally new capacity was available for the 2008/2009 Base Residual Auction. Incrementally new capacity includes new generation capacity resources, capacity upgrades to existing generation capacity resources, new Demand Resources, and upgrades to existing Demand Resources. The net increase is partially offset by generation capacity resource retirements and derations to existing generation capacity resources. However, as shown in *Table 3*, each LDA and the RTO as a whole experienced a net increase in capacity resources that cleared in the 2008/2009 Base Residual Auction as compared to the 2007/2008 Base Residual Auction. This result is significant given that only approximately 3 months have elapsed since the 2007/2008 auction was cleared.



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**Table 4 – Incremental Capacity Resource Additions and Reductions Between the 2007/2008 Base Residual Auction and the 2008/2009 Base Residual Auction**

Capacity Changes (in ICAP)	RTO**		EMAAC		SWMAAC	
	2007/2008	2008/2009	2007/2008	2008/2009	2007/2008	2008/2009
Increase in Generation Capacity	602.0	724.2	134.7	293.4	0.0	52.0
Decrease in Generation Capacity	-674.6	-375.4	-257.7	-51.6	-112.0	-14.0
Increase in Demand Resource Capacity*	555.0	574.7	43.3	288.7	19.0	284.5
<b>Net Increase in Installed Capacity</b>	<b>482.4</b>	<b>923.5</b>	<b>-79.7</b>	<b>530.5</b>	<b>-93.0</b>	<b>322.5</b>

\*\* RTO numbers include EMAAC and SWMAAC

\* 2007/2008 values represent all DR for 2007/2008. 2008/2009 values represent increases in DR from 2007/2008 to 2008/2009.

Table 5 shows the changes that have occurred regarding resource deactivation and retirement since the RPM was approved by FERC. The MW values illustrated in Table 5 represent the quantity of unforced capacity cleared in 2008/2009 Residual Auction that came from resources that have either withdrawn their request to deactivate, postponed retirement, or been reactivated (i.e. came out of retirement or mothball state for the RPM auctions). This total accounts for 2313.6 MW of cleared unforced capacity in the 2008/2009 Base Residual Auction with most of the capacity in the EMAAC LDA.

**Table 5 – Changes to Generation Retirement Decisions Since RPM Approval**

	RTO**	EMAAC	SWMAAC
Withdrawn Deactivation Requests	2019.3	1857.2	0.0
Postponed Retirement	160.7	58.6	102.1
Reactivation	133.6	133.6	0.0
<b>Total</b>	<b>2313.6</b>	<b>2049.4</b>	<b>102.1</b>

Values Represent Cleared UCAP in the 2008/2009 BRA

\*\* RTO values include EMAAC and SWMAAC

Note: Not all survey data has been returned by participants. Values represent latest totals.



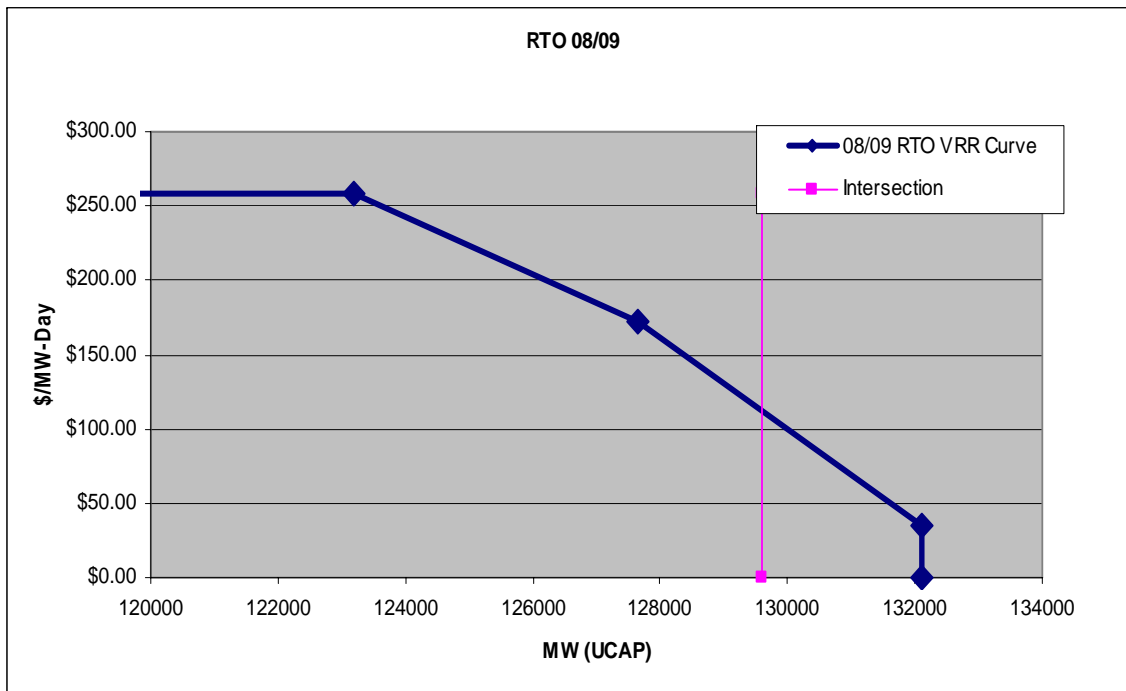
## 2008/ 2009 RPM Base Residual Auction Results

### Discussion of Factors Impacting the RPM Clearing Prices

#### RTO Clearing Price

The market clearing price of \$111.92/ MW-Day in the RTO was set by the intersection of the Supply Curve with the Variable Resource Requirement (VRR) Curve. This intersection occurred at a vertical segment of the Supply Curve. The 129,597.6 MW of UCAP cleared in the auction represents an increase in cleared UCAP of 188.4 MW over the 2007/2008 Base Residual Auction results and a reserve margin of 17.5%. Figure 1 graphically shows the clearing of the RTO.

**Figure 1 – Graphical Illustration of RTO Clearing Results for 2008/2009 Base Residual Auction**





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The increase in cleared UCAP with respect to the 2007/2008 results was offset by an increase in load in 2008/2009. This increase in load combined with a significantly smaller increase in supply was the primary driver that contributed to the significant increase in the RTO clearing price from \$40.80/MW-Day in 2007/2008, to \$111.92/MW-Day in 2008/2009.

This impact can be illustrated by comparing the “Remaining Eligible RPM Capacity” values from *Table 2* with the increase in cleared UCAP corresponding to a 16% Installed Reserve Margin (which can be obtained by comparing ‘Point (b)’ from the RTO VRR curves for each year). *Table 6* illustrates this comparison which indicates that a 16% Installed Reserve Margin in the RTO increased by 2407.7 MW across the RTO while capacity supply only increased by 270.9 MW. Therefore the RTO clearing price increase was primarily caused by the increase in load growth which was in excess of capacity supply growth by a substantial margin.

**Table 6 – Comparison of Increase in Capacity Supply to Increase in Load Obligation from 2007/2008 to 2008/2009**

	2007/2008	2008/2009	Increase
<b>Remaining Eligible RPM Capacity (MW)</b> (from Table 2)	138,497.7	138,768.6	<b>270.9</b>
<b>16% Installed Reserve Margin (MW)</b>	125,238.0	127,645.7	<b>2,407.7</b>

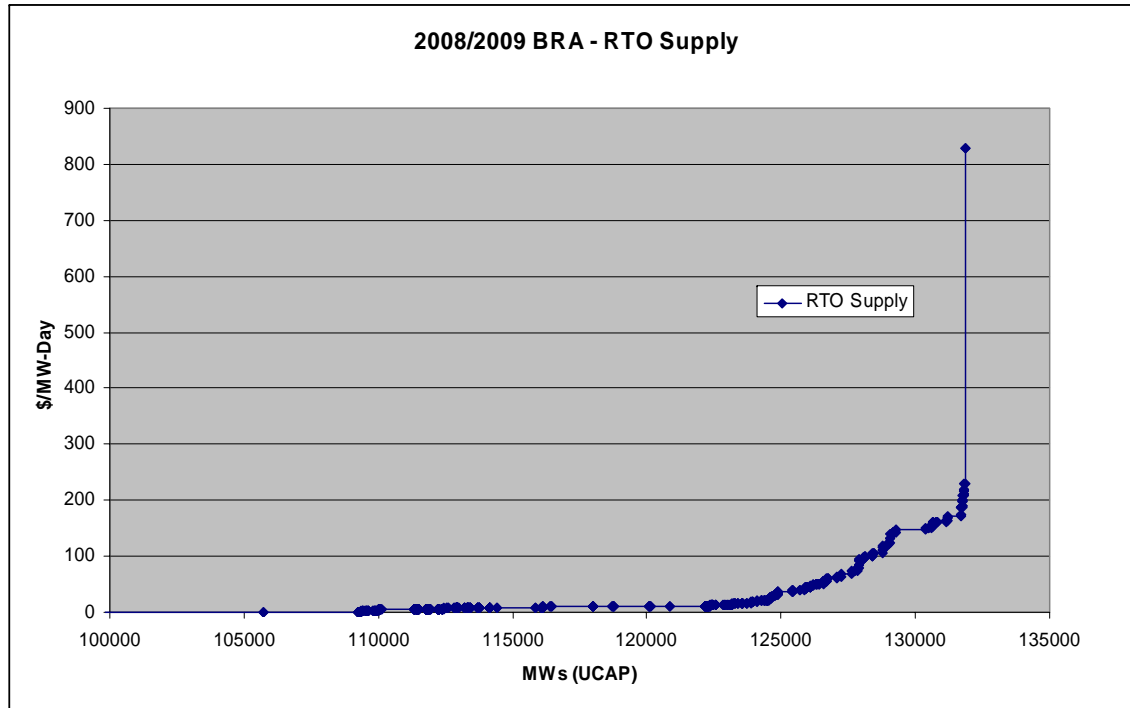
The shift right of the RTO VRR shown in *Table 6* exceeds that of the growth of capacity available for the 2008/2009 Base Residual Auction. This creates a scenario where the increase in demand can not be met by a similar increase in capacity. Thus the reserve margin fell to 17.5% on the VRR curve which resulted in the observed price increases.

The unmitigated supply curve for the RTO is depicted in Figure 2. The plot represents the UCAP offered by all participants at the EFORD and price submitted with that offer. (Note: As stated previously, since the RTO failed the Three-Pivotal Supplier Test, the mitigated supply curve was used to clear the auction.)



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Figure 2 - Supply Curve for the RTO (unmitigated)



### EMAAC Clearing Price

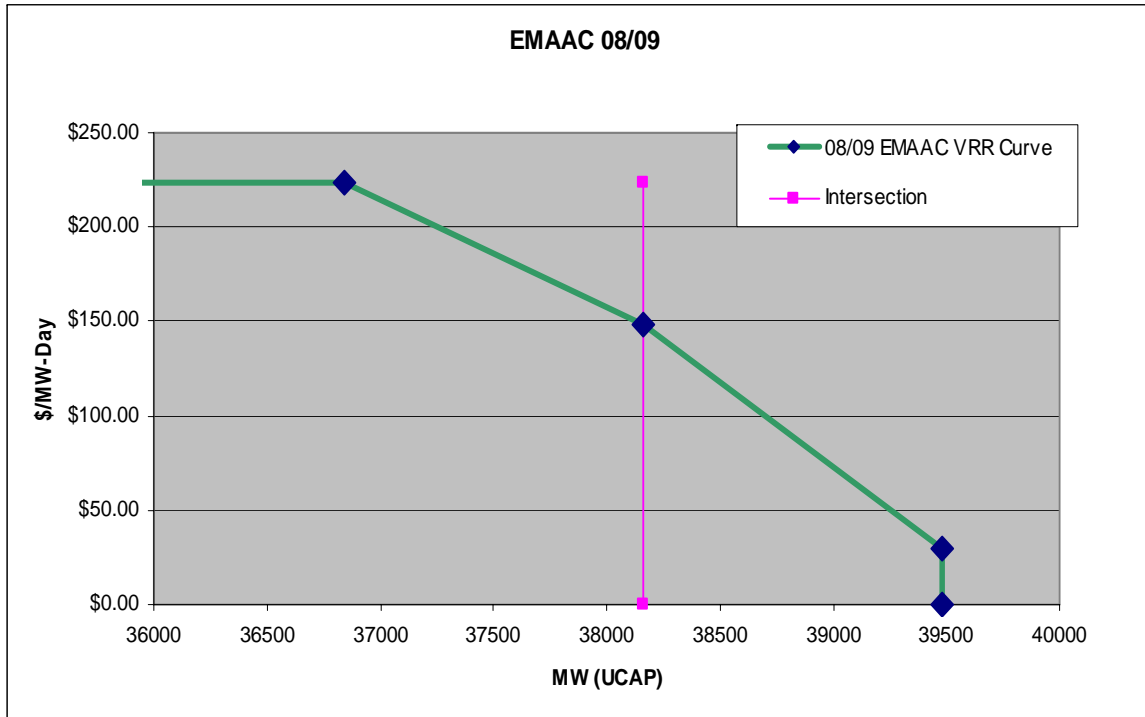
The intersection of supply and demand for the 2008/2009 Base Residual Auction occurred at the price of Net CONE. These results differ significantly from those of 2007/2008 where the intersection of supply and demand was generated by a vertical extension of the supply curve at a price significantly above Net CONE. The main reason for the differences is the rise in CETL (capacity import capability) into the EMAAC LDA resulting from multiple transmission upgrades scheduled to be in service prior to the 2008/2009 delivery year. This increase allows more capacity from outside the EMAAC LDA to be imported to meet the requirements of the constrained LDA, and thus resulted in the lower price in this LDA. From 2007/2008 to 2008/2009, the resource clearing price of



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EMAAC was reduced by nearly \$50/MW-Day from \$197.67/MW-Day in 2007/2008, to \$148.80/MW-Day in 2008/2009. The graph below (Figure 3) shows the clearing of EMAAC.

**Figure 3 - Graphical Illustration of EMAAC Clearing Results for 2008/2009 Base Residual Auction**



Given that the EMAAC LDA was still constrained in the 2008/2009 Base Residual Auction despite the increase in CETL, all load servers with a UCAP obligation will receive Capacity Transfer Right (CTR) Credits for the use of the transmission system. The value of these CTRs are calculated considering the difference in clearing prices between the RTO and EMAAC, and the amount of MWs imported into the LDA to meet the obligation of the load within the LDA. Because the amount of capacity deliverable to the LDA, the intersection of the LDA supply and demand, exceeds the obligation of the load within the LDA, the amount of CTR MWs allocated to the LDA load do not equal CETL.

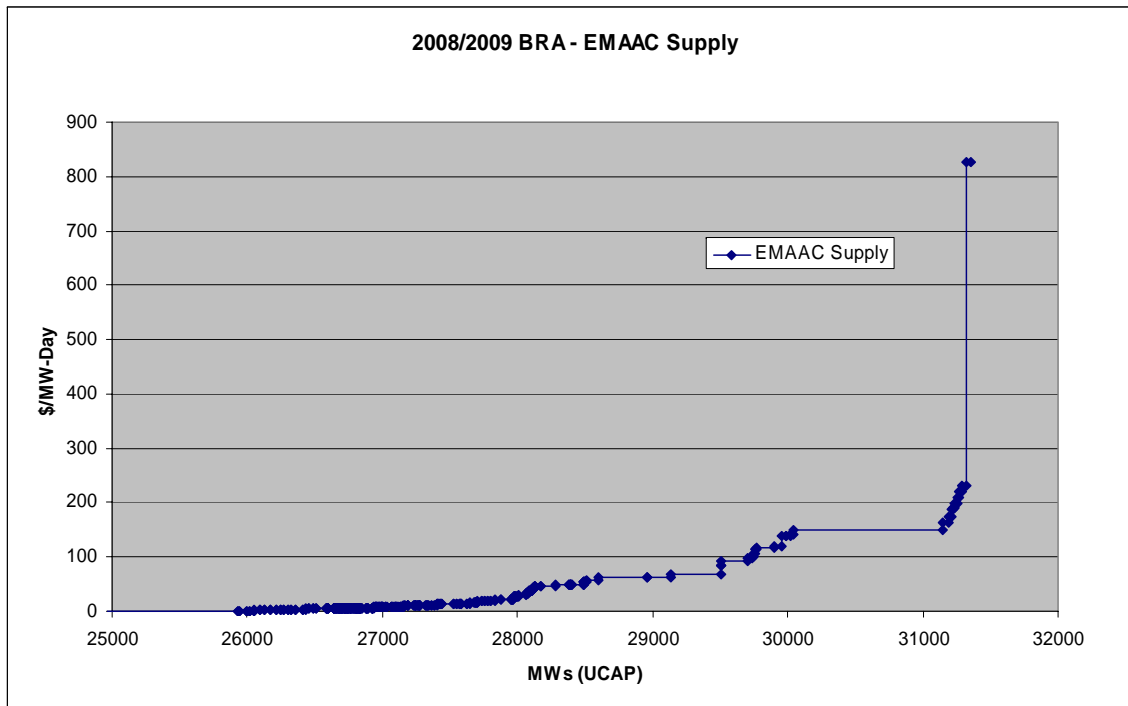




## 2008/ 2009 RPM Base Residual Auction Results

The unmitigated supply curve for EMAAC is depicted below in Figure 4. (Note: As stated previously, since the LDA failed the Three-Pivotal Supplier Test, the mitigated supply curve was used to clear the auction.) The plot represents the UCAP offered by all resources in the LDA at the EFORd and price submitted with that offer.

**Figure 4 - Supply Curve for EMAAC (unmitigated)**



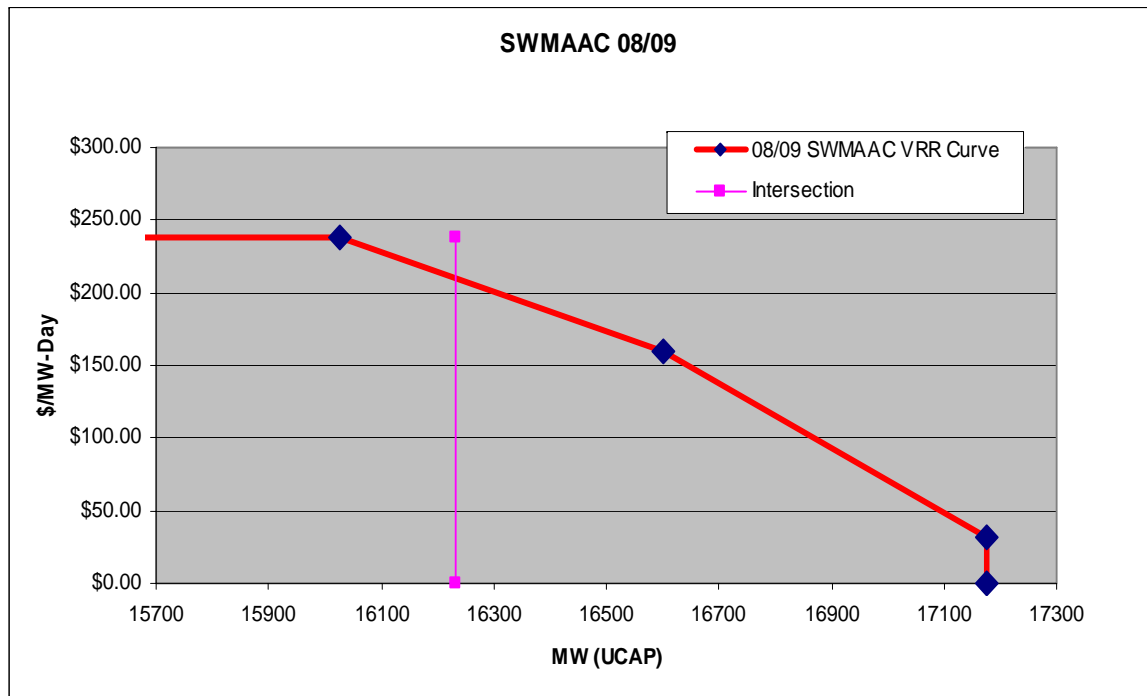


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### SWMAAC Clearing Price

The 2008/2009 Base Residual Auction for SWMAAC shows that the LDA is more constrained than it was in the 2007/2008 BRA. This is evident through the increase in the clearing price from \$188.54/MW-Day in 2007/2008, to \$210.11/MW-Day in 2008/2009. Although more capacity internal to the LDA was available in the auction, a decrease in CETL combined with an increase in Load Obligation resulted in the price increase. As illustrated in Table 1, all load servers in SWMAAC with a UCAP obligation will receive a credit based on available Capacity Transfer Capability into the LDA to offset a portion of the Resource Clearing Price. Figure 5 shows the SWMAAC clearing results.

**Figure 5 - Graphical Illustration of SWMAAC Clearing Results for 2008/2009 Base Residual Auction**





## 2008/ 2009 RPM Base Residual Auction Results

The unmitigated supply curve for SWMAAC is depicted below in Figure 6. (Note: As stated previously, since the LDA failed the Three-Pivotal Supplier Test, the mitigated supply curve was used to clear the auction). The plot represents the UCAP offered by all resources in the LDA at the EFORD and price submitted with that offer.

**Figure 6 - Supply Curve for SWMAAC (unmitigated)**

