



2014/2015 RPM Base Residual Auction Results

This document is an addendum to the 2014/2015 RPM Base Residual Auction (BRA) to provide further information on the factors that impacted auction clearing prices and to compare the results of the RPM BRA to the results of the 2013/2014 RPM BRA.

Comparison of BRA Results

Table 1 compares the cleared quantities and prices in the whole market and significant LDAs for the 2014/2015 and 2013/2014 BRAs. The 2014/2015 BRA locational price separation was significantly lower than the previous auction. Clearing prices in the western part of the PJM system increased \$98.26/MW-day from \$27.73/MW-day in the 2013/14 auction to \$125.99/MW-day in the 2014/15 auction (for Annual Resources and Extended Summer DR). Clearing prices in MAAC decreased \$89.65/MW-day from \$226.15/MW-day to \$136.50/MW-day (for Annual Resources and Extended Summer DR). Clearing prices in EMAAC decreased \$108.50/MW-day from \$245.00/MW-day to \$136.50/MW-day (for Annual Resources and Extended Summer DR). The factors that resulted in the reduction in locational price separation in 2014/15 auction include increases in capacity import margins into MAAC and EMAAC and changes to the shape and nature of the supply curve. The factors contributing to the increase in import margin were a substantial reduction in the reliability obligation (driven by lower forward load forecast) and upgrades to the transmission facilities that were limiting in the 2013/14 year. Supply-side factors that changed the supply curve and contributed to the narrowing locational price differences include: 1) increased generation avoided cost; 2) decreased energy/ancillary service revenue offset; 3) increased demand response offers; and 4) a decrease in offered capacity from generation located in the western part of the PJM RTO. The contribution of these factors to the changes in prices is quantified in the sections below.

Table 1 – Comparison of 2014/2015 BRA Results to 2013/2014 BRA Results

	Auction Results	RTO	MAAC	SWMAAC	PEPCO	EMAAC	DPL-SOUTH	PSEG	PS-NORTH
2013/2014 BRA Results	Cleared MW	152,743.3	67,639.9	11,242.1	4,791.7	32,835.4	1,612.4	8,019.1	4,159.4
	Resource Clearing Price	\$ 27.73	\$ 226.15	\$ 226.15	\$ 247.14	\$ 245.00	\$ 245.00	\$ 245.00	\$ 245.00
2014/2015 BRA Results	Cleared MW	149,975.1	67,176.0	11,124.1	5,614.8	32,554.0	1,439.2	7,583.0	3,817.5
	Resource Clearing Price (LMT)	\$ 125.47	\$ 125.47	\$ 125.47	\$ 125.47	\$ 125.47	\$ 125.47	\$ 125.47	\$ 213.97
	Resource Clearing Price (SMR)	\$ 125.99	\$ 136.50	\$ 136.50	\$ 136.50	\$ 136.50	\$ 136.50	\$ 136.50	\$ 225.00
	Resource Clearing Price (ANL)	\$ 125.99	\$ 136.50	\$ 136.50	\$ 136.50	\$ 136.50	\$ 136.50	\$ 136.50	\$ 225.00

Table 2 compares the committed and cleared megawatt (MW) quantities of unforced capacity (UCAP MW) by fuel type for the 2013/2014 and 2014/2015 BRAs. There is 2,769 MW less UCAP committed in the 2014/2015 BRA than was committed in the 2013/2014 Base Residual. There was a 16 percent, or almost 6,900 MW, reduction in committed coal capacity. It is likely the case that the decrease in committed coal capacity is related to some coal capacity representing the costs of environmental retrofits in their offers, and these costs made the uncleared coal capacity uneconomic relative to lower cost resources such as demand response and



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energy efficiency. In contrast, the reduction in committed coal capacity was offset in part by a 52 percent, or 4,836 MW, increase in committed demand response.

Table 2 – Comparison of Capacity Commitment by Resource type and Fuel Type (in UCAP MW)

Delivery Year	Data	Coal	Distillate Oil (No.2)	Gas	Kerosene	Nuclear	Other - Gas	Other - Liquid	Oil	Other - Solid	Solar	Water	Wood	Wind	Demand Response	Energy Efficiency	Grand Total
2013/2014	Offered UCAP	51,911	3,703	45,588	960	30,890	341	40	5,474	547	11	7,001	37	685	12,953	757	160,898
	Cleared UCAP	49,110	3,691	44,288	960	30,890	311	40	5,211	547	11	7,001	37	685	9,282	679	152,743
2014/2015	Offered UCAP	50,064	3,469	44,433	911	30,627	383	40	5,701	518	46	7,092	33	792	15,546	832	160,486
	Cleared UCAP	42,215	3,457	43,672	726	30,627	326	40	5,490	518	46	7,092	33	792	14,118	822	149,975
Delta	Offered UCAP	-1,847	-235	-1,155	-48	-263	42	0	227	-29	35	91	-4	107	2,593	75	-412
	Cleared UCAP	-6,895	-235	-616	-234	-263	15	0	280	-29	35	91	-4	107	4,836	143	-2,769

RTO Clearing Price

The 2014/2015 BRA clearing price for Annual Resources and Extended Summer DR of \$125.99/MW-Day in the RTO reflects the binding of the Minimum Extended Summer Resource Requirement, and includes a \$0.52/MW-day Extended Summer Price Adder. Because both Annual Resources and Extended Summer DR could satisfy this constraint, these resources received a higher price for capacity than Limited DR which cannot satisfy the requirement. The clearing price for Limited DR is \$125.47/MW-Day. These prices represent an increase of \$98.26/MW-day for Annual Resources and Extended Summer DR and an increase of \$97.74/MW-day for Limited DR from the 2013/2014 BRA RTO clearing price of \$27.73/MW-day. Approximately 85 to 95 percent of the price increase is a result of the changes in the supply offer curve due to: 1) increased generation avoided cost; 2) decreased energy/ancillary service revenue offset; 3) increased demand response offers; and 4) a decrease in offered capacity from generation located in the western part of the PJM RTO. The remaining 5 to 15% of the increase was driven by the increase in capacity transfer margins. The increased availability of demand resources mitigated the price increase by 10 to 20 percent.

The impacts related to change in the supply curve can be broken down as follows:

- Approximately 60 to 80% is attributable to increased generation avoided cost associated with installation of emission control technologies that are required to meet increasingly stringent environmental regulations (state, local and/or proposed EPA regulations);
- Approximately 10 to 20% is attributable to increased generation avoided cost associated with decreased energy/ancillary service revenue offset in the Market Seller Offer Caps due to revenue differences between 2007 used in the 2013/2014 BRA and 2010 used in the 2014/2015 BRA;



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- Approximately 20 to 30% is attributable to the decrease in supply from generation resources located in the western part of the RTO.

Figure 1 shows the Resource Clearing Price for Annual Resources and Extended Summer DR of \$125.99 in the RTO was set by the intersection of the Annual Resource and Extended Summer DR supply curve in blue with the vertical line representing the Minimum Extended Summer Resource Requirement. The Resource Clearing Price for Limited DR of \$125.47 in the RTO was set by the intersection of the Limited DR supply curve in orange with the VRR Curve. Figure 1 shows the clearing of Annual Resource and Extended Summer DR supply offers from lowest price offer to highest price offer until the total cleared MWs meet the vertical line representing the Minimum Extended Summer Resource Requirement at a clearing price of \$125.99. Once the Minimum Extended Resource Requirement is satisfied, resource offers are cleared from lowest offer to highest offer regardless of the product type of the offer until the supply curve intersects the VRR Curve at a clearing price of \$125.47.

MAAC Clearing Price

The 2014/2015 BRA clearing price for Annual Resources and Extended Summer DR is \$136.50/MW-day reflecting the binding Minimum Extended Summer Resource Requirement, and an Extended Summer Price Adder is \$11.03/MW-day. The price for Limited DR is \$125.47/MW-day, the same as in RTO, and reflecting the fact that there was no binding transmission limits in the 2014/2015 BRA. Annual Resources and Extended Summer DR may be used to satisfy the Minimum Extended Summer Resource Requirement and therefore receive the higher price, while Limited DR which cannot be used to satisfy that requirement receives the lower price. These prices represents a decrease of \$89.65/MW-day for Annual Resources and Extended Summer DR and a decrease of \$100.68/MW-day for Limited DR from the 2013/2014 BRA price of \$226.15/MW-day. The price decrease in MAAC was driven overwhelmingly by three factors: 1) increased transmission import limits; 2) a reduction in the reliability obligation; and 3) an increase in demand response offers. The MAAC price changes were much less impacted by emission control technology costs because many resources in the eastern part of the market had either installed such controls and reflected these costs in their offers in previous BRAs, or where offers did include such costs, these were incremental to controls already installed and therefore had a smaller impact. Approximately 40 to 60 percent of the price decrease is attributable to the increased capacity import limits, approximately 30 to 40 percent is attributable to the reduction in reliability obligation and up to 30 percent of the price decrease is attributable to an increase in demand response offers.

Figure 2 shows the Resource Clearing Price for Annual Resources and Extended Summer DR of \$136.50 in the MAAC LDA was set by the intersection of the Annual Resource and Extended Summer DR supply curve in blue with the vertical line representing the Minimum Extended Summer Resource Requirement. The Resource Clearing Price for Limited DR of \$125.47 in the MAAC LDA



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was set by the intersection of the Limited DR supply curve in orange with the VRR Curve in Figure 2. Figure 2 shows the clearing of Annual Resource and Extended Summer DR supply offers from lowest price offer to highest price offer until the cleared MWs meet the vertical line representing the Minimum Extended Summer Resource Requirement at a clearing price of \$136.50. Once the Minimum Extended Resource Requirement is satisfied, resource offers are cleared from lowest offer to highest offer regardless of the product type of the offer until the supply curve intersects the VRR Curve at a clearing price of \$125.47.

Impact of Compliance with increasingly stringent state, local and proposed EPA regulations

Compliance with increasingly stringent environmental regulations requires generation resources to install emission mitigation technology which increases the avoided cost offers of these resources. These increased costs were a significant contributor to the increase in clearing prices in the western part of the PJM RTO. The increasingly stringent environmental regulations had a two-fold impact on western PJM clearing prices: (1) generation resources affected by the increasingly stringent rules, the majority of which are located in the western part of the PJM RTO, could include the cost of investment needed to comply with the new regulations in their cost-based offer price and (2) the amount of offered MWs from generation resources decreased because the resource owners decided the resources were not viable to comply with future regulations and therefore will deactivate as opposed to installing equipment to comply with the new rules.

Impact of Increased LDA Capacity Import Margins

Capacity import margins into MAAC and EMAAC were higher in the 2014/2015 Base Residual Auction as compared to the 2013/2014 Base Residual Auction. The factors contributing to the increase in import margin were a substantial reduction in the reliability obligation (driven by lower forward load forecast) and upgrades to the transmission facilities that were limiting in the 2013/14 year. Table 3 compares the amount of transmission import capability that exists into the LDA, which is the Capacity Emergency Import Limit (CETL), and the reliability requirement for each LDA for the 2014/2015 and 2014/2013 Base Residual Auctions.



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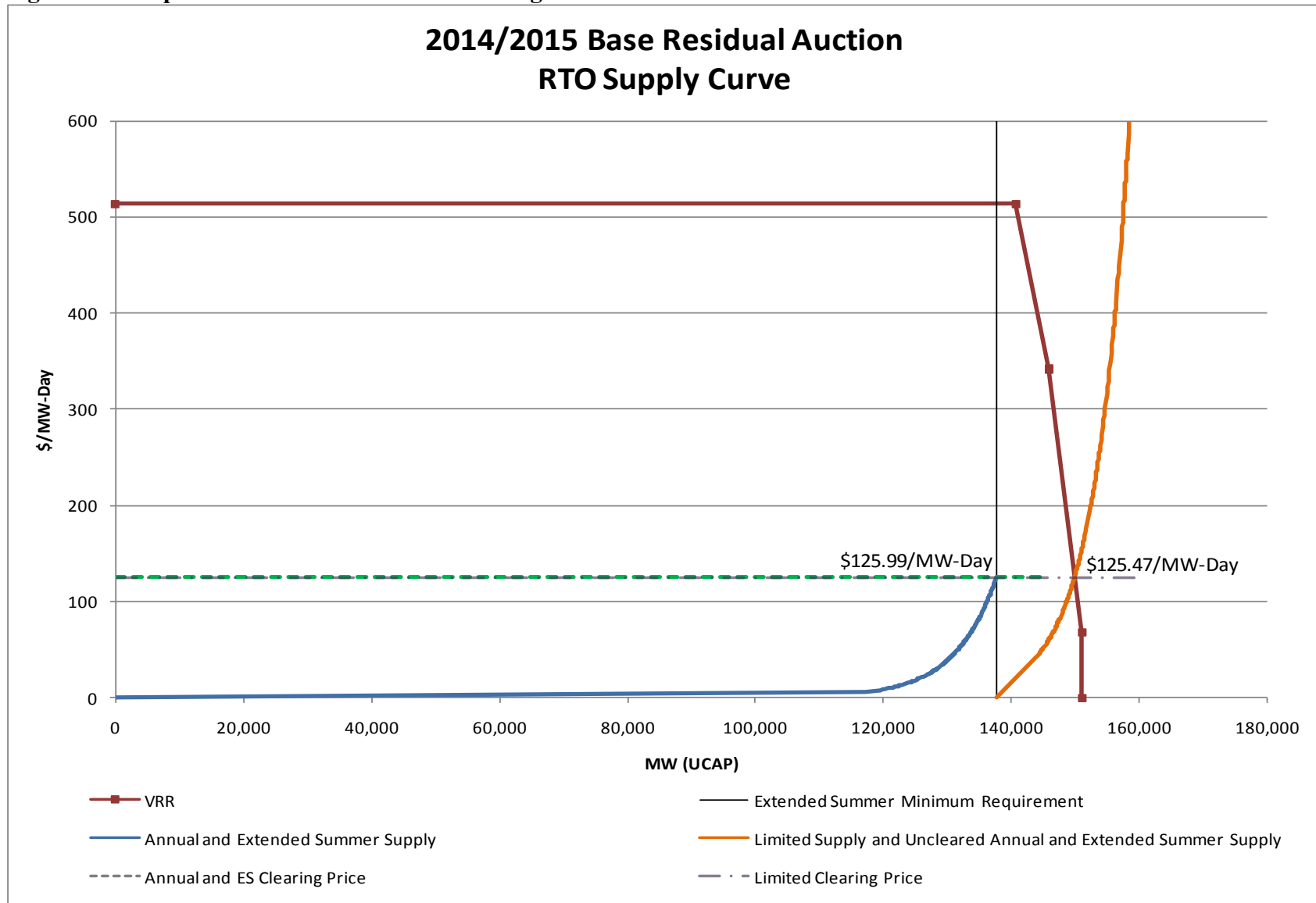
Table 3 - Comparison of LDA Capacity Import Limits and LDA Reliability Requirements

LDA	2013/2014		2014/2015		Delta	
	CETL	Reliability Requirement	CETL	Reliability Requirement	CETL	Reliability Requirement
MAAC	4,460	73,142	5,694	72,187	1,234	-955
EMAAC	7,095	40,398	8,189	39,995	1,094	-403
SWMAAC	6,725	17,899	7,719	17,358	994	-541
PS	5,868	13,401	5,721	13,099	-147	-302
PSNORTH	2,570	6,347	2,372	6,211	-198	-136
DPLSOUTH	2,123	2,996	1,925	3,018	-198	22
PEPCO	4,483	9,442	5,606	8,951	1,123	-491



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Figure 1 – Graphical Illustration of RTO Clearing Results for 2014/2015 Base Residual Auction





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Figure 2 – Graphical Illustration of MAAC Clearing Results for 2014/2015 Base Residual Auction

