2016/2017 RPM Base Residual Auction Results

Executive Summary

The 2016/2017 Reliability Pricing Model (RPM) Base Residual Auction (BRA) cleared 169,159.7 MW of unforced capacity in the RTO. Accounting for load and resource commitments under the Fixed Resource Requirement (FRR) the reserve margin for the entire RTO for the 2016/2017 Delivery Year is projected to be 21.1%, or 5.5% higher than the target reserve margin.

The 2016/2017 RPM BRA is the first auction to include the East Kentucky Power Cooperative (EKPC) load and resources that will be integrated into PJM on June 1, 2013. Absent the integration of the EKPC load, the forecast peak load for the 2016/2017 Delivery Year is effectively unchanged from 2015/2016. The 2016/2017 RPM BRA was also the first RPM auction for which the revised gross CONE values agreed to at settlement in ER12-513 were used and the revised Minimum Offer Price Rule (MOPR) filed by PJM on December 1, 2012, and accepted by FERC on May 3, 2013 was in effect.

This RPM auction included record setting combination of new generation, uprates, imports and energy efficiency surpassing the records in the 2015/2016 BRA. However, this BRA experienced a decrease in Demand Resource capacity offered and cleared.

Megawatts of Unforced Capacity Procured by Type

BRA Delivery Year	New Generation	Generation Uprates	Imports	Demand Response	Energy Efficiency
2016/2017	4,281.6	1,181.3	7,482.7	12,408.1	1,117.3
2015/2016	4,898.9	447.4	3,935.3	14,832.8	922.5
2014/2015	415.5	341.1	3,016.5	14,118.4	822.1

The net increase in supply from new entry and imports in conjunction with what is effectively flat demand growth resulted in capacity prices that were lower across the PJM footprint except in parts of New Jersey. The RTO price for Annual Resources was $59.37 per megawatt-day (MW-day). Prices for Limited Demand Resources (Limited DR) and Extended Summer Demand Resources (ES DR) mirrored the Annual Resource price at $59.37/MW-day.

Transmission constraints resulted in higher capacity prices in the MAAC, ATSI, and PSEG Locational Deliverability Areas (LDA). The MAAC prices were $119.13/MW-day for Annual, ES DR, and Limited DR products, prices in PSEG were $219/MW-day for all resource products, and in ATSI Annual and ES DR product prices were $114.23/MW-day while Limited DR cleared at $94.45/MW-day signifying that Extended Summer minimum resource requirement was binding.

2016/2017 RPM Base Residual Auction Results

Introduction

This document provides information for PJM stakeholders regarding the results of the 2016/2017 Reliability Pricing Model (RPM) Base Residual Auction (BRA). The 2016/2017 BRA opened on May 13, 2013 and the results were posted on May 24, 2013.

In each BRA, PJM seeks to procure a target capacity reserve level for the RTO in a least cost manner while recognizing locational constraints and minimum requirements on the commitment of less limited capacity products. Locational constraints are established by setting up Locational Deliverability Areas (LDAs) with each LDA having a separate target capacity reserve level and a maximum limit on the amount of capacity that it can import from resources located outside of the LDA. A Minimum Annual Resource Requirement and a Minimum Extended Summer Resource Requirement is established for the RTO and each modeled LDA and the auction clearing process can select Extended Summer Demand Resources (DR) or Annual Resources (Annual Resources include generation capacity resources, energy efficiency resources and Annual DR) out of merit order, if necessary, to procure the minimum required quantities, similar to the way in which RPM auctions can select resources out of merit order to address locational constraints. In those cases where one or both of the minimum resource requirements do bind in the auction solution, just as with resources selected to resolve locational constraints, resources selected out of merit order to meet the necessary minimum resource requirements will receive a minimum resource requirement adder to the system marginal price of capacity (in addition to any locational price adder(s) received to resolve locational constraints).

This document begins with a high level summary of the BRA results followed by sections containing detailed descriptions of the 2016/2017 BRA results and a discussion of the results in the context of the nine previous BRAs.

Summary of Results

The 2016/2017 Reliability Pricing Model (RPM) Base Residual Auction (BRA) cleared 169,159.7 MW of unforced capacity in the RTO representing a 21.5% reserve margin. When the Fixed Resource Requirement (FRR) load and resources are considered the reserve margin for the entire RTO is 21.1%.

The auction results show a continuing trend, starting in the 2014/2015 BRA, of a significant decline in the amount of coal-fired generation cleared and a continued shift to increased amounts of new natural gas-fired generation cleared. The auction clearing prices are lower than the previous auction driven largely by a flat demand growth and an increase in supply from substantial amount of new entry offers, uprates associated with repowering existing resources to natural gas, increased imports, and withdrawn deactivations.

The MAAC LDA, PSEG LDA and ATSI LDA are locationally constrained in the 2016/2017 BRA; therefore, Resource Clearing Prices in these LDAs differ from the Resource Clearing Prices of the rest of the RTO. The Resource Clearing Price for Limited DR,

Extended Summer DR and Annual Resources located in the RTO is $59.37/MW-day for all three capacity product types. The Resource Clearing Price for Limited DR, Extended Summer DR and Annual Resources located in the MAAC LDA is $119.13/MW-day for all three capacity product types. The Resource Clearing Price for Limited DR, Extended Summer DR and Annual Resources located in the PSEG LDA is $219.00/MW-day for all three capacity product types. The Resource Clearing Prices for Limited DR, Extended Summer DR and Annual Resources located in the ATSI LDA are $94.45/MW-day, $114.23/MW-day and $114.23/MW-day, respectively. The Minimum Extended Summer Resource Requirement was a binding constraint for the ATSI LDA and since both Annual Resources and Extended Summer DR may be used to satisfy this constraint, Annual Resources and Extended Summer DR received a higher Resource Clearing Price than did Limited DR in the ATSI LDA.

The annual resource clearing price in the MAAC region decreased from $167.46/MW-day in the 2015/2016 Delivery Year to $119.13/MW-day in the 2016/2017 Delivery Year; the annual resource clearing price in the PSEG LDA increased from $167.46/MW-day in the 2015/2016 Delivery Year to $219.00/MW-day in the 2016/2017 Delivery Year; the annual resource clearing price in the ATSI LDA decreased from $357.00/MW-day in the 2015/2016 Delivery Year to $114.23/MW-day in the 2016/2017 Delivery Year; and the annual resource clearing price in the rest of RTO region decreased from $136.00/MW-day in the 2015/2016 Delivery Year to $59.37/MW-day in the 2016/2017 Delivery Year.

The total quantity of new generation capacity resources offered into the auction was 6,597.9 MW (UCAP) comprised of 5,195.1 MW of new generation units and 1,402.8 MW of uprates to existing generation units. The quantity of new generation capacity resources cleared was 5,462.9 MW (UCAP) comprised of 4,281.6 MW (UCAP) from new generation units and 1,181.3 MW from uprates to existing generation units. The 5,462.9 MW of cleared from new generation capacity resources exceeds last year's then-record number of new generation capacity resources cleared in any single RPM auction of 5,346.3 MW.

The 2016/2017 Base Residual Auction results reflect a significant increase in the quantity of imports offered. The 7,493.7 MW (UCAP) of imports offered into the 2016/2017 BRA represents an increase of 3,558.4 MW (90.4%) over the imports that offered into the 2015/2016 BRA. The majority of the imports are from resources located in regions west of the PJM RTO. The quantity of both offered and cleared imports from generation resources located in MISO (including areas that will be integrated into MISO by the 2016/2017 Delivery Year) totaled 4,723.1 MW (UCAP). To participate in RPM, an external resource must demonstrate that it has requested Firm Transmission Service from the resource to and into PJM. Of the 7,482.7 MW of the offered imports that cleared in the auction, 4,788 MW (64%) have firm transmission service from the resource into PJM that is in confirmed status and the remainder has submitted firm transmission service requests for the complete required path that are now under study.

14,507.2 MW (UCAP) of demand resources offered into the 2016/2017 BRA which represents a decrease of 5,449.1 MW (27.3%) from the demand resources that offered into the 2015/2016 BRA. Approximately 86% (12,408.1 MW) of these demand resources cleared in the auction. Demand resources totaling 501.9 MW were included in FRR capacity plans for total DR capacity market participation of 15,009.1 MW.

The total quantity of energy efficiency (EE) resources offered into the 2016/2017 BRA was 1,156.8 MW (UCAP) which represents an increase of 23% over the EE resources that offered into the 2015/2016 BRA. Approximately 97% (1,117.3 MW UCAP) of these EE resources cleared in the auction.

All existing generation sell offers into the 2016/2017 BRA were subject to market power mitigation through the application of the Market Structure Test (i.e., the Three-Pivotal Supplier Test). The RTO as a whole failed the Market Structure Test, resulting in mitigation of any existing generation resources. Mitigation was applied to a supplier's existing generation resources resulting in utilizing the lesser of the supplier's approved offer cap for such resource or the supplier's submitted offer price for such resource in the RPM Auction clearing.

All generation capacity resources (including uprates to existing resources units of 20 MW or greater) that are based on combustion turbine, combined cycle and integrated gasification combined cycle technologies that have not cleared an RPM Auction prior to February 1, 2013 are subject to the Minimum Offer Price Rule (MOPR). External generation capacity resources meeting the above criteria and that have entered commercial operation on or after January 1, 2013 and that require sufficient transmission investment for delivery into PJM are also subject to MOPR. To avoid application of the minimum offer price, Capacity Market Sellers may request exemption through either a Competitive Entry Exemption request or a Self-Supply Exemption request. The table below shows the requested, granted and cleared aggregate quantity (in ICAP MW) of each exemption type received and processed by PJM.

Exemption Type	Requested Quantity (ICAP MW)	Granted Quantity (ICAP MW)	Cleared Quantity (ICAP MW)
Competitive Entry	11,820.6	11,820.6	3,482.1
Self-Supply	1,432.5	1,432.5	1,432.5
Total	**13,253.1**	**13,253.1**	**4,914.6**

2016/2017 RPM Base Residual Auction Results

A further discussion of the 2016/2017 Base Residual Auction results and additional information regarding the 2016/2017 Reliability Pricing Model (RPM) Base Residual Auction results are detailed in the body of this report. The discussion also provides a comparison of the 2016/2017 auction results to the results from the 2007/2008 through 2015/2016 RPM auctions.

2016/2017 RPM Base Residual Auction Results

2016/2017 Base Residual Auction Results Discussion

Table 1 contains a summary of the RTO clearing prices resulting from the 2016/2017 RPM Base Residual Auction in comparison to those from 2007/2008 through 2015/2016 RPM Base Residual Auctions.

Table 1 –RPM Base Residual Auction Resource Clearing Price Results in the RTO

	RTO									
Auction Results	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012[1]	2012/2013	2013/2014[2]	2014/2015[3]	2015/2016[4]	2016/2017[5]
Resource Clearing Price	$40.80	$111.92	$102.04	$174.29	$110.00	$16.46	$27.73	$125.99	$136.00	$59.37
Cleared UCAP (MW)	129,409.2	129,597.6	132,231.8	132,190.4	132,221.5	136,143.5	152,743.3	149,974.7	164,561.2	169,159.7
Reserve Margin	19.2%	17.5%	17.8%	16.5%	18.1%	20.9%	20.2%	19.6%	20.2%	21.1%

1) 2011/2012 BRA was conducted without Duquesne zone load.
2) 2013/2014 BRA includes ATSI zone
3) 2014/2015 BRA includes Duke zone
4) 2015/2016 BRA includes a significant portion of AEP and DEOK zone load previously under the FRR Alternative
5) 2016/2017 BRA includes EKPC zone

The cleared UCAP is the amount of unforced capacity that was procured in the auction to meet the RTO demand for capacity. The 2016/2017 Reliability Pricing Model (RPM) Base Residual Auction cleared 169,159.7 MW of unforced capacity in the RTO representing a 21.5% reserve margin. When the Fixed Resource Requirement (FRR) load and associated resources are considered the actual reserve margin for the entire RTO is 21.1%. The Reserve Margin presented in Table 1 represents the percentage of installed capacity cleared in RPM and committed by FRR entities in excess of the RTO load (including load served under the Fixed Resource Requirement alternative).

New Generation Resource Participation

The 2016/2017 Base Residual Auction results reflect a continuation of last year's strong participation by new generation capacity resources mostly in the form of new (or uprates to existing) gas-fired combustion turbine and combined cycle generation units. The total quantity of new generation capacity resources offered into the auction was 6,597.9 MW (UCAP) comprised of 5,195.1 MW of new generation units and 1,402.8 MW of uprates to existing generation units. The quantity of new generation capacity resources cleared was 5,462.9 MW (UCAP) comprised of 4,281.6 MW (UCAP) from new generation units and 1,181.3 MW from uprates to existing generation units. The 5,462.9 MW of cleared new generation capacity resources exceeds last year's then-record number of new generation capacity resources cleared in any single RPM auction of 5,346.3 MW.

Table 2A shows the breakdown, by major LDA, of capacity in UCAP terms of new units and uprates at existing units offered in the auction and capacity actually clearing in the auction. 83% of the new generation capacity that offered into the 2016/2017BRA cleared the auction.

Table 2A – Offered and Cleared New Generation Capacity by LDA (in UCAP MW)

	Offered			Cleared		
LDA	Uprate	New Unit	Total	Uprate	New Unit	Total
EMAAC	578.6	215.5	794.1	383.0	59.0	442.0
MAAC	858.0	1,711.1	2,569.1	662.4	1,554.6	2,217.0
Total RTO	1,402.8	5,195.1	6,597.9	1,181.3	4,281.6	5,462.9

*All MW Values are in UCAP Terms

*MAAC includes EMAAC

**RTO includes MAAC

Capacity Import Participation

As shown in Table 2B, the 2016/2017 Base Residual Auction results reflect a significant increase in the quantity of imports offered. The imports offered into the 2016/2017 BRA was 7,493.7 MW (UCAP) which represents an increase of 3,558.4 MW (90.4%) over the imports that offered into the 2015/2016 BRA. The majority of the imports are from resources located in regions west of the PJM RTO. The quantity of both offered and cleared imports from generation resources located in MISO (including areas that will be integrated into MISO by the 2016/2017 Delivery Year) were 4,723.1 MW (UCAP). To participate in RPM, an external resource must demonstrate that it has requested Firm Transmission Service from the resource to and into PJM. Of the 7,482.7 MW of imports that cleared in the auction, 4,788 MW (64%) has firm transmission service from the resource into PJM that is in confirmed status and the remainder has submitted firm transmission service requests for the complete required path that are now under study.

Table 2B – Offered and Cleared Capacity Imports (in UCAP MW)

	Offered MW*			Cleared MW*		
Region	2015/2016	2016/2017	Delta	2015/2016	2016/2017	Delta
West of PJM	3,621.2	7,080.5	3,459.3	3,621.2	7,069.5	3,448.3
Other	314.1	413.2	99.1	314.1	413.2	99.1
Total Imports	3,935.3	7,493.7	3,558.4	3,935.3	7,482.7	3,547.4

*All MW Values are in UCAP Terms

Demand Resource Participation

The total quantity of demand resources offered into the 2016/2017 BRA was 14,507.2 MW (UCAP), representing a decrease of 27.3% over the demand resources that offered into the 2015/2016 BRA. Of the 14,507.2 MW of total demand response that offered in this auction, 12,408.1 MW cleared and will be awarded capacity payments. The cleared demand response is 2,424.7 MW less than that which cleared in the 2015/2016 BRA representing a 16.3% decrease. Of this change, 1,298.5 fewer MWs of DR cleared in the MAAC LDA and 1,126.2 fewer MWs of DR cleared outside of the MAAC LDA. Table 3A contains a comparison of the Demand Resources Offered and Cleared in 2015/2016 BRA & 2016/2017 BRA represented in UCAP.

Table 3A – Comparison of Demand Resources Offered and Cleared in 2015/16 BRA & 2016/17 BRA represented in UCAP

		Offered MW*			Cleared MW*		
LDA	Zone	2015/2016	2016/2017	Increase in Offered MW	2015/2016	2016/2017	Increase in Cleared MW
EMAAC	AECO	249.2	189.8	(59.4)	207.9	172.3	(35.6)
EMAAC/DPL-S	DPL	524.3	471.4	(52.9)	433.5	439.5	6.0
EMAAC	JCPL	524.0	252.0	(272.0)	350.2	222.7	(127.5)
EMAAC	PECO	1,458.1	592.9	(865.2)	801.8	531.1	(270.7)
PSEG/PS-N	PSEG	1,081.9	636.5	(445.4)	796.1	630.7	(165.4)
EMAAC	RECO	37.4	12.4	(25.0)	20.9	10.1	(10.8)
EMAAC Sub Total		**3,874.9**	**2,155.0**	**(1,719.9)**	**2,610.4**	**2,006.4**	**(604.0)**
PEPCO	PEPCO	966.4	683.8	(282.6)	867.4	663.9	(203.5)
SWMAAC	BGE	1,328.8	970.0	(358.8)	1,141.7	936.6	(205.1)
MAAC	METED	472.2	407.6	(64.6)	348.6	313.6	(35.0)
MAAC	PENELEC	710.7	452.0	(258.7)	525.6	431.5	(94.1)
MAAC	PPL	1,810.3	1,035.1	(775.2)	1,155.0	998.2	(156.8)
MAAC Sub Total**		**9,163.3**	**5,703.5**	**(3,459.8)**	**6,648.7**	**5,350.2**	**(1,298.5)**
RTO	AEP	2,175.6	1,720.6	(455.0)	1,684.4	1,377.2	(307.2)
RTO	APS	1,175.1	945.1	(230.0)	935.5	684.6	(250.9)
ATSI	ATSI	2,038.5	1,920.7	(117.8)	1,763.7	1,811.9	48.2
RTO	COMED	2,765.9	1,722.3	(1,043.6)	1,698.2	1,236.2	(462.0)
RTO	DAY	324.8	301.3	(23.5)	196.9	246.8	49.9
RTO	DEOK	358.8	394.9	36.1	278.9	304.4	25.5
RTO	DOM	1,653.1	1,457.5	(195.6)	1,381.8	1,120.6	(261.2)
RTO	DUQ	301.2	204.5	(96.7)	244.7	143.1	(101.6)
RTO	EKPC	-	136.8	136.8	-	133.1	133.1
Grand Total		**19,956.3**	**14,507.2**	**(5,449.1)**	**14,832.8**	**12,408.1**	**(2,424.7)**

*All MW values are expressed in UCAP

**MAAC sub-total includes all MAAC Zones

Each demand resource (DR) offering into the 2016/2017 RPM BRA was identified by the DR provider as being one of three DR product types: (1) Annual DR, (2) Extended Summer DR or (3) Limited DR. A DR provider with a resource that can potentially qualify as more than one of the three DR product types may submit separate but coupled sell offers for each DR product type for

which it qualifies. By coupling separate DR offers, the seller informs PJM and the RPM auction clearing engine that only one of the coupled demand resources may clear at most. Submitting DR offers in a coupled manner is not a requirement; it is an optional offer type available to the seller in addition to the conventional, non-coupled offer type. DR offers that are not specified as being coupled offers are cleared independent of each other and each offer could potentially clear.

Table 3B shows a breakdown of Demand Resources Offered and Cleared in the 2016/2017 BRA grouped by the potential Demand Resource coupling scenarios.

Table 3B – Breakdown of Demand Resources Offered versus Cleared by Product Type in the 2016/17 BRA in UCAP

	Resource Offer MW (UCAP)			Cleared MW (UCAP)		
Coupling Scenario	Limited Product Type	Extended Summer Product Type	Annual Product Type	Limited Product Type	Extended Summer Product Type	Annual Product Type
Annual, Extended Summer, and Limited	3,020.5	2,984.0	2,952.1	1,788.8	342.6	-
Annual and Extended Summer	-	23.8	19.2	-	0.7	-
Annual and Limited	-	-	-	-	-	-
Extended Summer and Limited	4,603.3	4,603.4	-	3,393.3	333.2	-
Annual Only	-	-	114.6	-	-	88.6
Extended Summer Only	-	1,823.6	-	-	1,793.5	-
Limited Only	4,919.4	-	-	4,667.4	-	-
Grand Total	**12,543.2**	**9,434.8**	**3,085.9**	**9,849.5**	**2,470.0**	**88.6**

Energy Efficiency Resource Participation

An energy efficiency (EE) resource is a project that involves the installation of more efficient devices/equipment or the implementation of more efficient processes/systems exceeding then-current building codes, appliance standards, or other relevant standards at the time of installation as known at the time of commitment. The EE resource must achieve a permanent, continuous reduction in electric energy consumption (during the defined EE performance hours) that is not reflected in the peak load forecast used for the Base Residual Auction for the Delivery Year for which the EE resource is proposed. The EE resource must be fully implemented at all times during the delivery year, without any requirement of notice, dispatch, or operator intervention. Of the 1,156.8 MWs of energy efficiency that offered into the 2016/2017 Base Residual Auction, 1,117.3 MW of EE resources cleared in the auction and will be awarded capacity payments.

Table 3C contains a summary of the demand resources and energy efficiency resources that offered and cleared by zone in the 2016/2017 Base Residual Auction. Approximately 85.5% of the demand resources and 96.6% of the energy efficiency resources that were offered into the BRA cleared. The uncleared resources were offered at a price above the applicable clearing price for the LDA in which the resource was offered.

Figure 1 illustrates the demand side participation in the PJM Capacity Market from 2005/2006 Delivery Year to the 2016/2017 Delivery Year. Demand side participation includes active load management (ALM) prior to 2007/2008 Delivery Year, Interruptible Load for Reliability (ILR) and demand resources offered into each BRA and nominated in FRR Plans, and energy efficiency resources starting with the 2012/2013 Delivery Year. The demand side participation in the capacity market has increased dramatically since the inception of RPM in the 2007/2008 Delivery Year through the 2015/2016 BRA, but as shown in Figure 1 total demand side participation has and cleared resources for the 2016/2017 BRA have fallen below the levels seen in the 2014/2015 BRA.

2016/2017 RPM Base Residual Auction Results

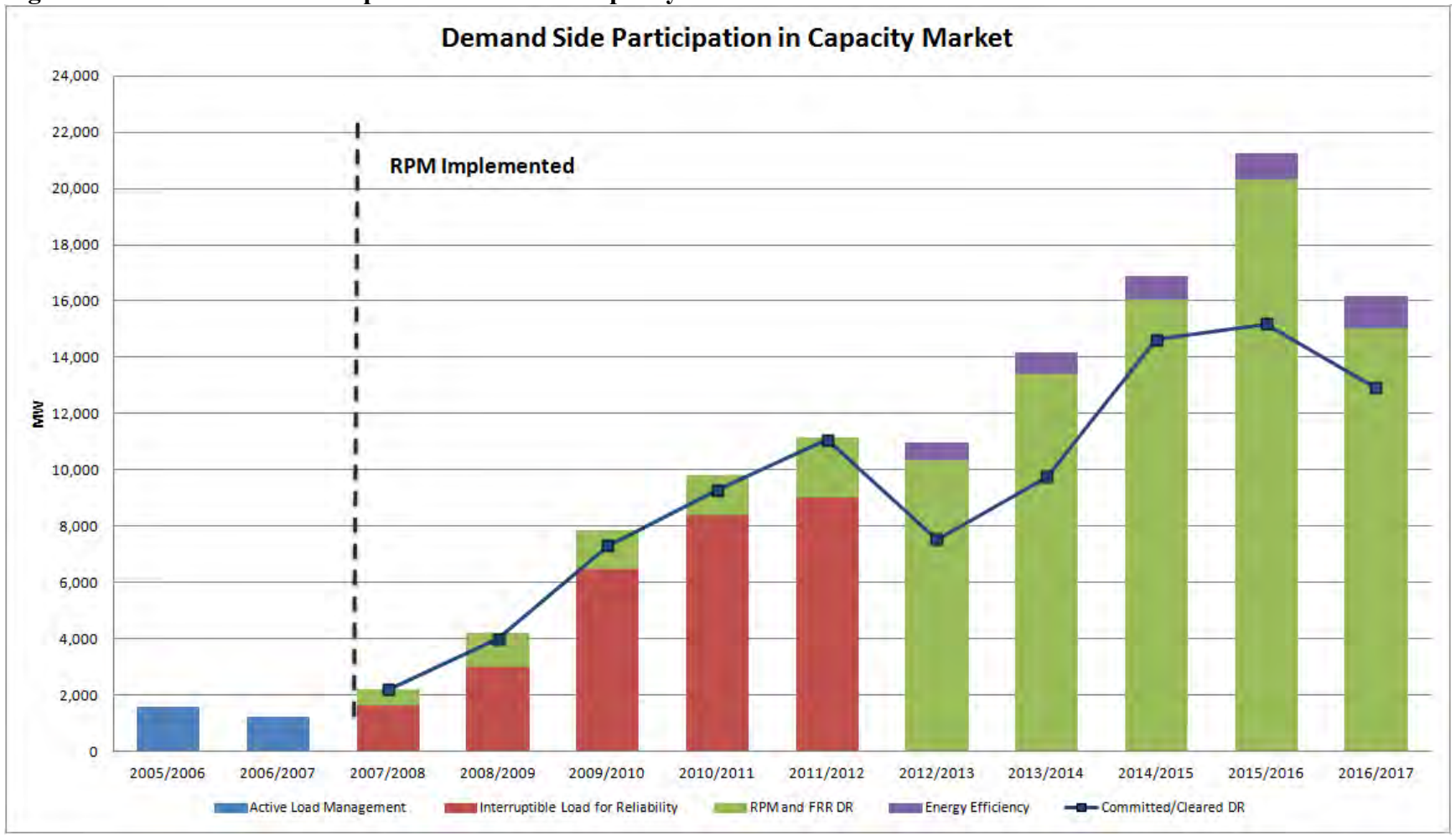
Table 3C – Comparison of Demand Resources and Energy Efficiency Resources Offered versus Cleared in the 2016/17

		Offered MW*			Cleared MW*		
LDA	Zone	Demand	EE	Total	Demand	EE	Total
EMAAC	AECO	189.8	2.0	**191.8**	172.3	1.7	**174.0**
EMAAC/DPL-S	DPL	471.4	22.4	**493.8**	439.5	21.2	**460.7**
EMAAC	JCPL	252.0	10.2	**262.2**	222.7	4.9	**227.6**
EMAAC	PECO	592.9	14.6	**607.5**	531.1	11.5	**542.6**
PSEG/PS-N	PSEG	636.5	14.9	**651.4**	630.7	11.9	**642.6**
EMAAC	RECO	12.4	-	**12.4**	10.1	-	**10.1**
EMAAC Sub Total		**2,155.0**	**64.1**	**2,219.1**	**2,006.4**	**51.2**	**2,057.6**
PEPCO	PEPCO	683.8	83.7	**767.5**	663.9	83.5	**747.4**
SWMAAC	BGE	970.0	124.9	**1,094.9**	936.6	124.9	**1,061.5**
MAAC	METED	407.6	11.1	**418.7**	313.6	10.4	**324.0**
MAAC	PENELEC	452.0	10.6	**462.6**	431.5	9.9	**441.4**
MAAC	PPL	1,035.1	36.5	**1,071.6**	998.2	30.2	**1,028.4**
MAAC Sub Total**		**5,703.5**	**330.9**	**6,034.4**	**5,350.2**	**310.1**	**5,660.3**
RTO	AEP	1,720.6	118.9	**1,839.5**	1,377.2	118.7	**1,495.9**
RTO	APS	945.1	19.2	**964.3**	684.6	14.4	**699.0**
ATSI	ATSI	1,920.7	198.9	**2,119.6**	1,811.9	196.6	**2,008.5**
RTO	COMED	1,722.3	426.7	**2,149.0**	1,236.2	426.7	**1,662.9**
RTO	DAY	301.3	13.1	**314.4**	246.8	12.9	**259.7**
RTO	DEOK	394.9	5.7	**400.6**	304.4	5.2	**309.6**
RTO	DOM	1,457.5	30.2	**1,487.7**	1,120.6	28.4	**1,149.0**
RTO	DUQ	204.5	13.2	**217.7**	143.1	4.3	**147.4**
RTO	EKPC	136.8	-	**136.8**	133.1	-	**133.1**
Grand Total		**14,507.2**	**1,156.8**	**15,664.0**	**12,408.1**	**1,117.3**	**13,525.4**

*All MW values are expressed in UCAP

**MAAC sub-total includes all MAAC Zones

Figure 1 – Demand Side Participation in the PJM Capacity Market



Renewable Resource Participation
870.5 MW of wind resources were offered into and cleared the 2016/2017 Base Residual Auction as compared to 796.3 MW of wind resources that offered into and cleared the 2015/2016 Base Residual Auction. The capacity factor applied to wind resources is 13%, meaning that for every 100 MW of wind energy, 13 MW are eligible to meet capacity requirements. The 870.5 MW of cleared wind capacity translates to 6,696 MW of wind energy nameplate capability that is expected to be available in the 2016/2017 Delivery Year.

89.8 MW of solar resources were offered into and cleared the 2016/2017 Base Residual Auction as compared to 56.2 MW of solar resources that offered into and cleared the 2015/2016 Base Residual Auction. The capacity factor applied to solar resources is 38%, meaning that for every 100 MW of solar energy, 38 MW are eligible to meet capacity requirements. The 89.8 MW of cleared solar capacity translates to 236.3 MW of solar energy that is expected to be available in the 2016/2017 Delivery Year.

LDA Results
An LDA was modeled in the Base Residual Auction and had a separate VRR Curve if (1) the LDA has a CETO/CETL margin that is less than 115%; or (2) the LDA had a locational price adder in any of the three immediately preceding Base Residual Auctions; or (3) the LDA is likely to have a locational price adder based on a PJM analysis using historic offer price levels; or (4) the LDA is EMAAC, SWMAAC, and MAAC.

As a result of the above criteria, MAAC, EMAAC, SWMAAC, PSEG, PS-NORTH, DPL-SOUTH, PEPCO, ATSI and ATSI-Cleveland were modeled as LDAs in the 2016/2017 RPM Base Residual Auction; however, only the MAAC, PSEG and ATSI LDAs were binding constraints resulting in a Locational Price Adder for these LDAs. A Locational Price Adder represents the difference in Resource Clearing Prices for the Limited capacity product between a resource in a constrained LDA and the immediate higher level LDA.

Table 4 contains a summary of the clearing results in the LDAs from the 2016/2017 RPM Base Residual Auction.

Table 4 –RPM Base Residual Auction Clearing Results in the LDAs

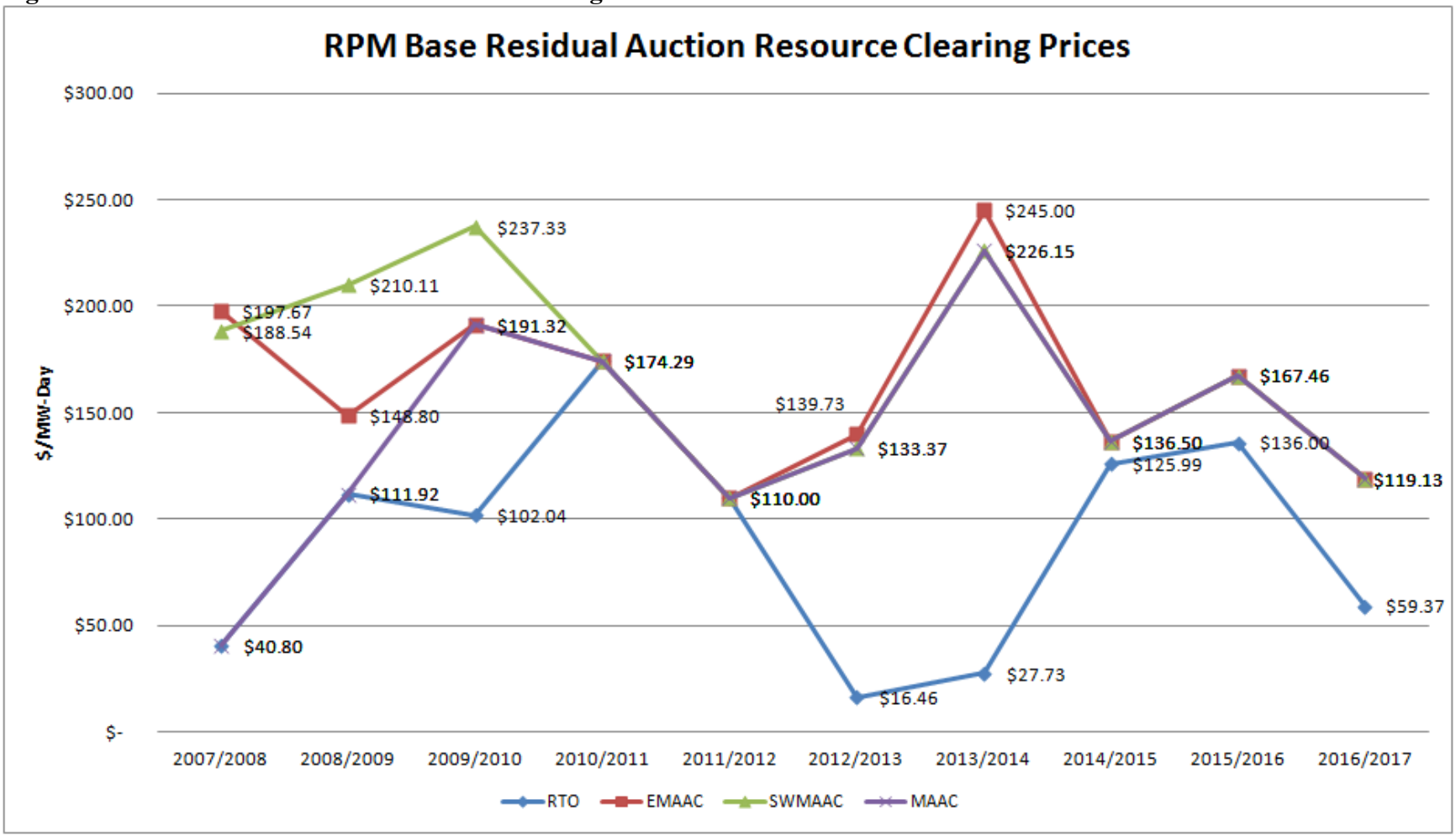
Auction Results	RTO	MAAC	SWMAAC	PEPCO	EMAAC	DPL-SOUTH	PSEG	PS-NORTH	ATSI	ATSI-CLEVELAND
Offered MW (UCAP)	184,380.0	71,607.5	12,386.0	6,126.1	34,139.9	1,764.4	6,784.3	4,181.6	12,791.3	2,874.3
Cleared MW (UCAP)	169,159.7	66,546.4	12,050.0	6,093.7	31,521.7	1,746.0	6,298.6	3,702.1	8,672.2	2,850.0
System Marginal Price	$59.37	$59.37	$59.37	$59.37	$59.37	$59.37	$59.37	$59.37	$59.37	$59.37
Locational Price Adder*	$0.00	$59.76	$0.00	$0.00	$0.00	$0.00	$99.87	$0.00	$35.08	$0.00
Extended Summer Price Adder**	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$19.78	$19.78
Annual Price Adder	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
Resource Clearing Price for Limited Resources	$59.37	$119.13	$119.13	$119.13	$119.13	$119.13	$219.00	$219.00	$94.45	$94.45
Resource Clearing Price for Extended Summer Resources	$59.37	$119.13	$119.13	$119.13	$119.13	$119.13	$219.00	$219.00	$114.23	$114.23
Resource Clearing Price for Annual Resources	$59.37	$119.13	$119.13	$119.13	$119.13	$119.13	$219.00	$219.00	$114.23	$114.23

*Locational Price Adder is with respect to the immediate parent LDA

**Annual Resources and Extended Summer DR receive the Extended Summer Price Adder

Since the MAAC, PSEG and ATSI LDAs were constrained LDAs, Capacity Transfer Rights (CTRs) will be allocated to loads in the constrained LDAs for the 2016/2017 Delivery Year. CTRs are allocated by load ratio share to all Load Serving Entities (LSEs) in a constrained LDA that has a higher clearing price than the unconstrained region. CTRs serve as a credit back to the LSEs in the constrained LDA for use of the transmission system to import less expensive capacity into that constrained LDA and are valued at the difference in the clearing prices of the constrained and unconstrained regions.

Figure 2 – Base Residual Auction Resource Clearing Prices



*2014/2015 through 2016/2017 Prices reflect the Annual Resource Clearing Prices.

2016/2017 RPM Base Residual Auction Results

Table 5 contains a summary of the offer and resultant data in the RTO for each cleared Base Residual Auction from 2008/09 through the 2016/2017 Delivery Years. The summary includes all resources located in the RTO (including FRR Capacity Plans)

A total of 216,510.2 MW of installed capacity was eligible to be offered into the 2016/2017 Base Residual Auction. Of this eligible amount, 8,412.2 MW were from external resources that had fulfilled the eligibility requirements to be considered a PJM Capacity Resource. As illustrated in Table 5, the amount of capacity exports in the 2016/2017 auction remained the same as that of the previous auction and FRR commitments decreased by 421.3 MW from the 2015/2016 Delivery Year to 15,576.6 MW.

A total of 191,190.8 MW of capacity was offered into the Base Residual Auction. This is an increase of 4,911.6 MW from that which was offered into the 2015/2016 BRA. A total of 25,319.4 MW was eligible, but not offered due to either (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, approved retirement requests not yet reflected in eRPM, and excess capacity owned by an FRR entity.

Table 5 –RPM Base Residual Auction Generation, Demand, and Energy Efficiency Resource Information in the RTO

	RTO[1]								
Auction Supply (all values in ICAP)	**2008/2009**	**2009/2010**	**2010/2011**	**2011/2012[2]**	**2012/2013**	**2013/20143**	**2014/2015[4]**	**2015/2016[5]**	**2016/2017[6]**
Internal PJM Capacity	166,037.9	167,026.3	168,457.3	169,241.6	179,791.2	195,633.4	202,696.3	207,559.1	208,098.0
Imports Offered	2,612.0	2,563.2	2,982.4	6,814.2	4,152.4	4,766.1	4,299.4	4,649.7	8,412.2
Total Eligible RPM Capacity	**168,649.9**	**169,589.5**	**171,439.7**	**176,055.8**	**183,943.6**	**200,399.5**	**206,995.7**	**212,208.8**	**216,510.2**
Exports / Delistings	4,205.8	2,240.9	3,378.2	3,389.2	2,783.9	2,624.5	1,230.1	1,218.8	1,218.8
FRR Commitments	24,953.5	25,316.2	26,305.7	25,921.2	26,302.1	25,793.1	33,612.7	15,997.9	15,576.6
Excused	722.0	1,121.9	1,290.7	1,580.0	1,732.2	1,825.7	3,255.2	8,712.9	8,524.0
Total Eligible RPM Capacity - Excused	**29,881.3**	**28,679.0**	**30,974.6**	**30,890.4**	**30,818.2**	**30,243.3**	**38,098.0**	**25,929.6**	**25,319.4**
Remaining Eligible RPM Capacity	**138,768.6**	**140,910.5**	**140,465.1**	**145,165.4**	**153,125.4**	**170,156.2**	**168,897.7**	**186,279.2**	**191,190.8**
Generation Offered	138,076.7	140,003.6	139,529.5	143,568.1	142,957.7	156,894.1	153,048.1	166,127.8	176,145.3
DR Offered	691.9	906.9	935.6	1,597.3	9,535.4	12,528.7	15,043.1	19,243.6	13,932.9
EE Offered	0.0	0.0	0.0	0.0	632.3	733.4	806.5	907.8	1,112.6
Total Eligible RPM Capacity Offered	**138,768.6**	**140,910.5**	**140,465.1**	**145,165.4**	**153,125.4**	**170,156.2**	**168,897.7**	**186,279.2**	**191,190.8**
Total Eligible RPM Capacity Unoffered	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

[1]RTO numbers include all LDAs and include capacity of FRR Entities.

[2]All generation in the Duquesne zone is considered external to PJM for the 2011/2012 BRA.

[3]2013/2014 includes ATSI zone

[4]2014/2015 includes Duke zone

[5]2015/2016 includes a significant portion of AEP and DEOK zone load previously under the FRR Alternative

[6]2016/2017 includes EKPC zone

2016/2017 RPM Base Residual Auction Results

Table 6 shows the Generation, Demand Resources, and Energy Efficiency Resources Offered and Cleared in the RTO translated into Unforced Capacity (UCAP) MW amounts. Participants' sell offer EFORd values were used to translate the generation installed capacity values into unforced capacity (UCAP) values. Demand resource (DR) sell offers and energy efficiency resource (EE) sell offers were converted into UCAP using the appropriate Demand Resource (DR) Factor and Forecast Pool Requirement (FPR) for the delivery year.

In UCAP terms, a total of 184,380.0 MW were offered into the 2016/2017 Base Residual Action, comprised of 168,716.0 MW of generation capacity, 14,507.2 MW of capacity from demand resources, and 1,156.8 MW of capacity from energy efficiency resources. Of those offered, a total of 169,159.7 MW of capacity was cleared in the auction.

Of the 169,159.7 MW of capacity that cleared in the auction, 155,634.3 MW were from generation capacity, 12,408.1 MW were from demand resources, and 1,117.3 MW were from energy efficiency resources. Capacity that was offered but not cleared in the Base Residual Auction will be eligible to offer into the First, Second and Third Incremental Auctions for the 2016/2017 Delivery Year.

Table 6 – Generation, Demand Resources, and Energy Efficiency Resources Offered and Cleared in UCAP MW

	RTO*								
Auction Results (all values in UCAP)**	**2008/2009**	**2009/2010**	**2010/2011**	**2011/2012**	**2012/2013**	**2013/2014**	**2014/2015**	**2015/2016**	**2016/2017**
Generation Offered	131,164.8	132,614.2	132,124.8	136,067.9	134,873.0	147,188.6	144,108.8	157,691.1	168,716.0
DR Offered	715.8	936.8	967.9	1,652.4	9,847.6	12,952.7	15,545.6	19,956.3	14,507.2
EE Offered	-	-	-	-	652.7	756.8	831.9	940.3	1,156.8
Total Offered	**131,880.6**	**133,551.0**	**133,092.7**	**137,720.3**	**145,373.3**	**160,898.1**	**160,486.3**	**178,587.7**	**184,380.0**
Generation Cleared	129,061.4	131,338.9	131,251.5	130,856.6	128,527.4	142,782.0	135,034.2	148,805.9	155,634.3
DR Cleared	536.2	892.9	939.0	1,364.9	7,047.2	9,281.9	14,118.4	14,832.8	12,408.1
EE Cleared	0.0	0.0	0.0	0.0	568.9	679.4	822.1	922.5	1,117.3
Total Cleared	**129,597.6**	**132,231.8**	**132,190.5**	**132,221.5**	**136,143.5**	**152,743.3**	**149,974.7**	**164,561.2**	**169,159.7**
Uncleared	2,283.0	1,319.2	902.2	5,498.8	9,229.8	8,154.8	10,511.6	14,026.5	15,220.3

* RTO numbers include all LDAs

** UCAP calculated using sell offer EFORd for Generation Resources. DR and EE UCAP values include appropriate FPR and DR Factor.

Table 7 contains a summary of capacity additions and reductions from the 2007/2008 Base Residual Auction to the 2016/2017 Base Residual Auction. A total of 7,010.8 MW of incrementally new capacity in PJM was available for the 2016/2017 Base Residual Auction. This incrementally new capacity includes new generation capacity resources, capacity upgrades to existing generation capacity resources and new energy efficiency resources. The increase is more than offset by generation capacity deratings on existing generation capacity resources and a reduction in the quantity of offered demand resources to yield a net decrease of 3,291.9 MW of installed capacity.

Table 7 also illustrates the total amount of resource additions and reductions over ten Delivery Years since the implementation of the RPM construct. Over the period covering the first ten RPM Base Residual Auctions, 28,177.8 MW of new generation capacity was added which was partially offset by 20,319.4 MW of capacity de-ratings or retirements over the same period. Additionally, 14,370.7 MW of new demand resources and 1,112.6 MW of new energy efficiency resources were offered over the course of the ten Delivery Years since RPM's inception. The total net increase in installed capacity in PJM over the period of the last ten RPM auctions was 23,341.7 MW.

Table 7 – Incremental Capacity Resource Additions and Reductions to Date

	RTO*										
Capacity Changes (in ICAP)	2007/2008	2008/2009	2009/2010	2010/2011	2011/2012	2012/2013	2013/2014[1]	2014/2015[2]	2015/2016	2016/2017[3]	Total
Increase in Generation Capacity	602.0	724.2	1,272.3	1,776.2	3,576.3	1,893.5	1,737.5	1,582.8	8,207.0	6,806.0	28,177.8
Decrease in Generation Capacity	-674.6	-375.4	-550.2	-301.8	-264.7	-3,253.9	-1,924.1	-1,550.1	-6,432.6	-4,992.0	-20,319.4
Net Increase in Demand Resource Capacity**	555.0	574.7	215.0	28.7	661.7	7,938.1	2,993.3	2,514.4	4,200.5	-5,310.7	14,370.7
Net Increase in Energy Efficiency Capacity**	0	0	0	0	0	632.3	101.1	73.1	101.3	204.8	1,112.6
Net Increase in Installed Capacity	**482.4**	**923.5**	**937.1**	**1503.1**	**3973.3**	**7,210.0**	**2,907.8**	**2,620.2**	**6,076.2**	**-3,291.9**	**23,341.7**

* RTO numbers include all LDAs

** Values are with respect to the quantity offered in the previous year's Base Residual Auction.

1) Does not include Existing Generation located in ATSI Zone

2) Does not include Existing Generation located in Duke Zone

3) Does not include Existing Generation located in EKPC Zone

Table 7A provides a further breakdown of the generation increases and decreases for the 2016/2017 Delivery Year on an LDA basis.

Table 7A – Generation Increases and Decreases by LDA Effective 2016/2017Delivery Year

LDA Name	Uprates	Derates
EMAAC	826.8	-1,372.7
MAAC	2,667.9	-2,762.8
Total RTO	**6,806.0**	**-4,992.0**

All Values in ICAP terms
*MAAC includes EMAAC
**RTO includes MAAC

Table 8 provides a breakdown of the new capacity offered into the each BRA into the categories of new resources, reactivated units, and uprates to existing capacity, and then further down into resource type. As shown in this table, there was a significant quantity of generating capacity from new resources and uprates to existing resources offered into the 2016/2017 BRA. The capacity offered in the 2016/2017 BRA resulted from both new generating resources and uprates to existing resources including gas, diesel, coal, wind, and nuclear resources. While the largest growth remains in gas turbines and combined cycle plants, a fair amount of incremental capacity in Steam (coal) and Nuclear was offered into the recent auctions.

Figure 3 shows the continuing trend of increasing capacity commitments by natural gas-fired generation resources and decreasing commitments by coal-fired generation resources. Nearly 10,000 MW of coal that offered into the 2016/2017 Base Residual Auction did not clear the auction and cleared capacity from gas-fired generation resources exceeded cleared capacity from coal-fired generation resources by over 15,000 MW.

2016/2017 RPM Base Residual Auction Results

Table 8 – Further Breakdown of Incremental Capacity Resource Additions from 2007/2008 to 2016/17

	Delivery Year	CT/GT	Combined Cycle	Diesel	Hydro	Steam	Nuclear	Solar	Wind	Fuel Cell	Total
New Capacity Units (ICAP MW)	2007/2008			18.7	0.3						19.0
	2008/2009			27.0					66.1		93.1
	2009/2010	399.5		23.8		53.0					476.3
	2010/2011	283.3	580.0	23.0					141.4		1,027.7
	2011/2012	416.4	1,135.0			704.8		1.1	75.2		2,332.5
	2012/2013	403.8		7.8		621.3			75.1		1,108.0
	2013/2014	329.0	705.0	6.0		25.0		9.5	245.7		1,320.2
	2014/2015	108.0	650.0	35.1	132.9			28.0	146.6		1,100.6
	2015/2016	1,382.5	5,914.5	19.4	148.4	45.4		13.8	104.9	30.0	7,658.9
	2016/2017	171.1	4,994.5	38.3		24.0		32.1	54.3		5,314.3
Capacity from Reactivated Units (ICAP MW)	2007/2008					47.0					47.0
	2008/2009					131.0					131.0
	2009/2010										-
	2010/2011	160.0		10.7							170.7
	2011/2012	80.0				101.0					181.0
	2012/2013										-
	2013/2014										-
	2014/2015			9.0							9.0
	2015/2016										
	2016/2017					21.0					21.0
Uprates to Existing Capacity Resources (ICAP MW)	2007/2008	114.5		13.9	80.0	235.6	92.0				536.0
	2008/2009	108.2	34.0	18.0	105.5	196.0	38.4				500.1
	2009/2010	152.2	206.0		162.5	61.4	197.4		16.5		796.0
	2010/2011	117.3	163.0		48.0	89.2	160.3				577.8
	2011/2012	369.2	148.6	57.4		186.8	292.1		8.7		1,062.8
	2012/2013	231.2	164.3	14.2		193.0	126.0		56.8		785.5
	2013/2014	56.4	59.0	0.3		215.0	47.0		39.6		417.3
	2014/2015	104.9		0.5	41.5	138.6	107.0	7.1	73.6		473.2
	2015/2016	216.8	72.0	4.7	15.7	63.4	149.2	2.2	24.1		548.1
	2016/2017	436.6	420.0	3.3	7.4	484.3	102.6	1.7	14.8		1,470.7
	Total	5,640.9	15,245.9	331.1	742.2	3,636.8	1,312.0	95.5	1,143.4	30.0	28,177.8

Figure 3 – Offered and Cleared Quantities of Coal and Gas

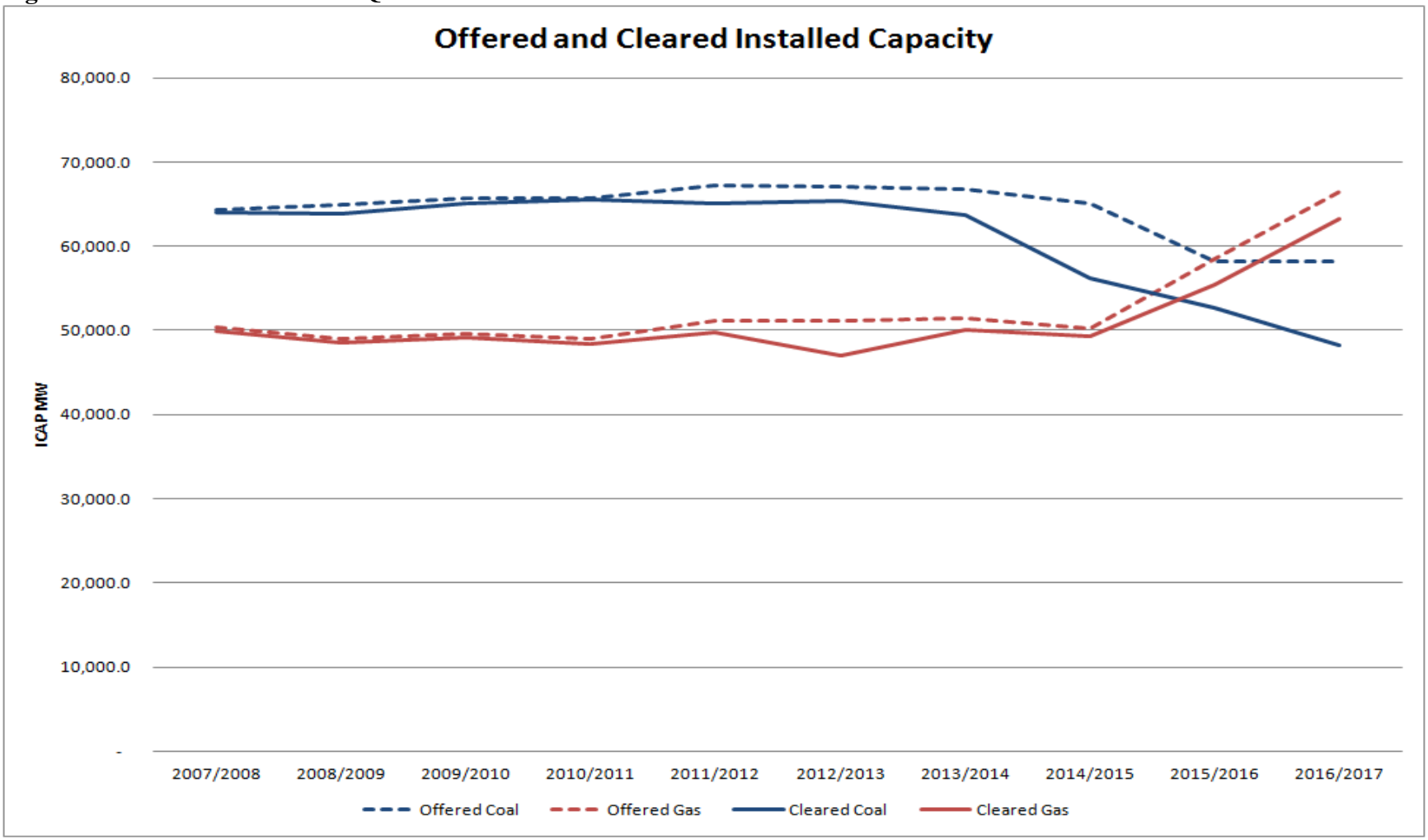


Figure 4 provides an illustration of the cumulative increase in new generation capacity by fuel type since the inception of RPM (June 1, 2007).

Figure 4: Cumulative Generation Capacity Increases by Fuel Type

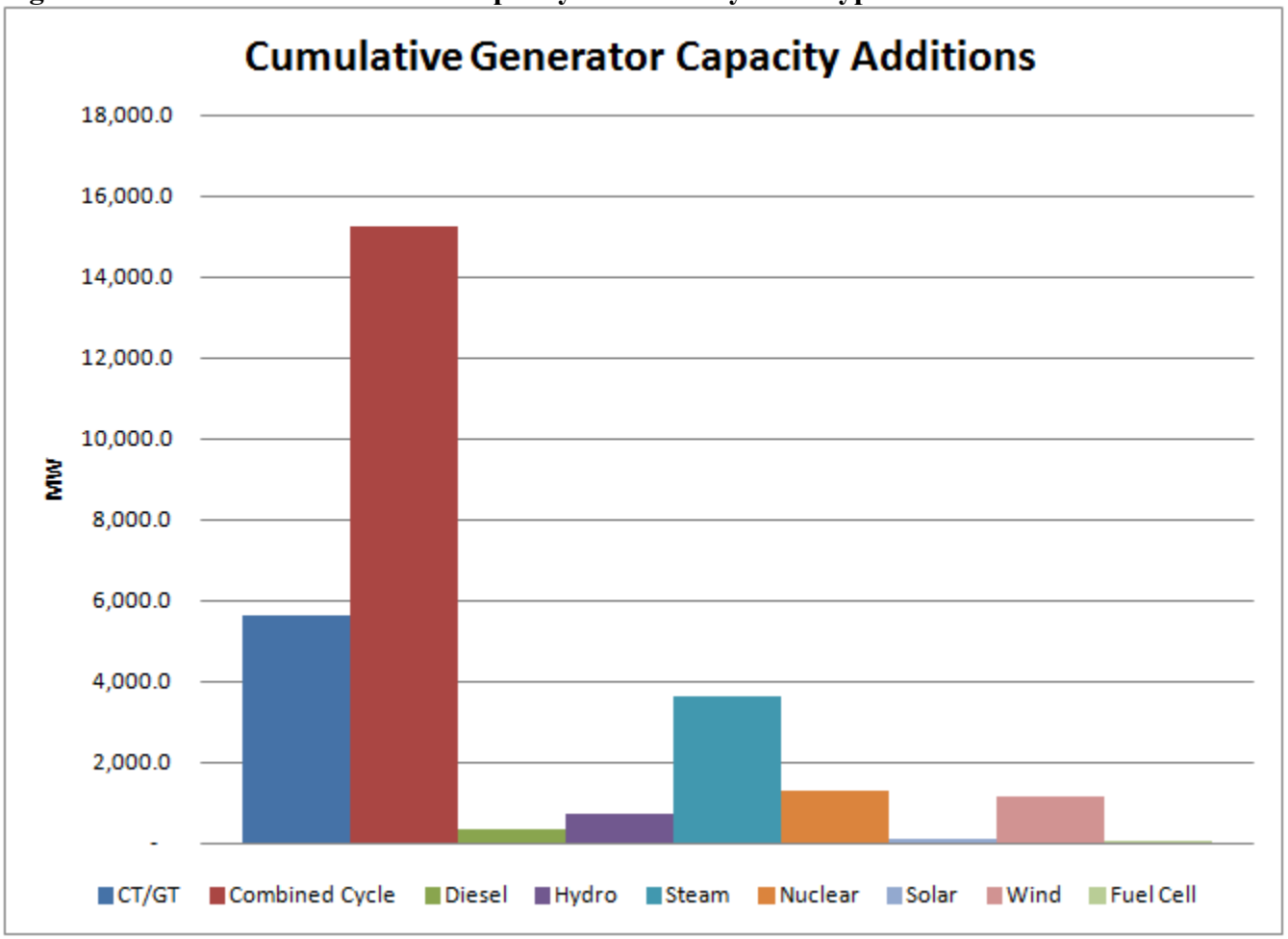


Table 9 shows the changes that have occurred regarding resource deactivation and retirement since the RPM was approved by FERC. The MW values shown in Table 9 represent the quantity of unforced capacity cleared in the 2016/2017 Base Residual Auction that came from resources that have either withdrawn their request to deactivate, postponed retirement, or been reactivated (i.e., came out of retirement or mothball state for the RPM auctions) since the inception of RPM. This total accounts for 4,422.6 MW of cleared UCAP in the 2016/2017 BRA which equates to 4,921.5 MW of ICAP Offered.

Table 9 – Changes to Generation Retirement Decisions since RPM

	RTO	
Generation Resource Decision Changes	ICAP Offered	UCAP Cleared
Withdrawn Deactivation Requests	2,272.6	1,875.4
Postponed or Cancelled Retirement	2,345.9	2,265.4
Reactivation	303.0	281.8
Total	**4,921.5**	**4,422.6**

RPM Impact To Date

As illustrated in Table 5, for the 2016/2017 auction, the capacity exports were 1218.8 MW and the capacity imports were 8,412.2 MW. The difference between the capacity imports and exports results is a net capacity import of 7,193.4 MW.

In the planning year preceding the RPM auction implementation, 2006/2007, there was a net capacity export of 2,616.0 MW. In this auction, PJM is now a net importer of 7,193.4 MW. Therefore RPM's impact on PJM capacity interchange is 9,809.4 MW.

The minimum net impact of the RPM implementation on the availability of Installed Capacity resources for the 2016/2017 planning year can be estimated by adding the net change in capacity imports and exports over the period, the forward demand and energy efficiency resources, the increase in Installed Capacity over the RPM implementation period from Table 8 and the net change in generation retirements from Table 9. Therefore, as illustrated in Table 10, the minimum estimated net impact of the RPM implementation on the availability of capacity in the 2016/2017 compared to what would have happened absent this implementation is 58,110.6 MW.

Table 10 shows the details on RPM's impact to date in ICAP terms.

Table 10 – RPM's Impact to Date

Change in Capacity Availability	Installed Capacity MW
New Generation	20,450.6
Generation Upgrades (not including reactivations)	7,167.5
Generation Reactivation	559.7
Forward Demand and Energy Efficiency Resources	15,483.3
Cleared ICAP from Withdrawn or Canceled Retirements	4,640.1
Net increase in Capacity Imports	9,809.4
Total Impact on Capacity Availability in 2016/2017 Delivery Year	**58,110.6**

Discussion of Factors Impacting the RPM Clearing Prices

The main factors impacting 2016/2017 RPM BRA clearing prices relative to 2015/2016 BRA clearing prices are provided below separated out by significant changes to the market design and effects on the demand-side and supply-side of the market. Overall, the main factors and events leading up to the 2016/2017 BRA were not as dramatic as the issuance of the final EPA Mercury and Air Toxics Standards and associated generation retirements, but are more incremental. Yet, there were sufficient incremental changes, many of which were not readily observable prior to the BRA, that reinforce one another such that taken together have resulted in the decrease in prices and higher reserve margin than resulted from the 2015/2016 BRA.

Significant Changes to RPM Design for the 2016/2017 Base Residual Auction

On January 31, 2013 in ER12-513 FERC approved updated gross Cost of New Entry (CONE) values that were filed as part of a settlement between PJM and various generation owners, load serving entities, industrial customers, and public power entities on November 21, 2012. The settlement CONE values resulted in gross CONE values that were slightly below the gross CONE values that would have been in place absent the settlement by 2.5 % in RTO, 0.5 % in MAAC, 1.4 % in PSEG, and 5.1 % in ATSI. As discussed below in the subsection regarding changes that affect demand, this slight reduction in gross CONE helped mitigate the Handy-Whitman Index adjustment to account for inflation used in developing 2016/2017 demand for capacity.

On May 3, 2013 FERC approved, with an effective date of February 5, 2013, changes to the Minimum Offer Price Rule (MOPR) filed on December 7, 2012 in ER13-535. The approved changes to the MOPR included the creation of Competitive Entry and Self Supply Exemptions for new entry, uprates to, and repowerings to combustion turbine, combined cycle, or IGCC technologies. All other technologies are exempt from the MOPR. In order to get a Competitive Entry Exemption a merchant plant developer can attest that it is receiving no anomalous revenue streams or subsidies that were not otherwise available to all market participants from state agencies or state procurement processes that had not been deemed competitive and non-discriminatory. A load serving entity could request a Self Supply Exemption by showing that it met specified net short and net long thresholds that indicated it had little or no incentive to exercise buyer side market power or inject excess ratepayer financed capacity into the market below cost as well as not receiving anomalous revenue streams or subsidies not generally available to other market participants from state agencies or procurement processes. Entities receiving the Competitive Entry or Self Supply Exemptions are permitted to offer their resources at any price they choose including a price of $0/MW-day. The Commission also retained the unit specific exception process in place for the 2015/2016 BRA for resources that do not qualify for the Competitive Entry and Self Supply Exemptions. This change, while garnering much

attention likely had little effect on the BRA outcomes for 2016/2017 as less than half of all requested and approved MOPR exemptions were a part of the market clearing solution.

Finally, commencing in October 2012, PJM initiated a stakeholder process to address and implement enhancements to standardize the information that must be submitted as a part of Demand Resource (DR) Plans for approval prior to Planned DR being offered into the BRA. These enhancements were envisioned to be Manual changes only. The rationale for the enhancement and standardization of DR Plans came out of the observation that there was insufficient information in these plans that could be used by PJM in development of its Regional Transmission Expansion Plan (RTEP) and that offered DR in the 2015/2016 BRA exceeded 20 % of the forecast zonal peak load in some zones and may not reflect a practical level of DR penetration as CSPs may be counting the same resources/sites in each of their plans. On March 28, 2013 DR Plan enhancements were approved by the Markets and Reliability Committee. However, on April 3, 2013 a group of Curtailment Service Providers (CSPs) filed a complaint at the Commission in EL13-57 alleging the approved manual changes violated section 205 of the Federal Power Act in that they affect rates, terms and conditions of service and therefore should be filed with the Commission for approval. The Commission granted the complaint on April 19, 2013, the date DR Plans were due, such that the approved DR Plan Enhancements were not in effect for the 2016/2017 BRA. While not effective for the BRA, the discussion and stakeholder approval of the DR Plan Enhancements may have had the effect of causing CSPs to be more cautious about how much DR could reasonably be offered, and could explain the reduction in DR offered and cleared as discussed below.

Changes that impacted the Demand Curve:

- The forecast reliability requirement increased from 177,184.1 MW in 2015/2016 to 180,332.2 MW in 2016/2017 or an increase of 3,148.1 MW (1.77%). However, after accounting for the integration of the EKPC forecast peak load of 2,200.2 MW and adding the reserve margin of 15.6 %, the reliability requirement was effectively flat increasing only 604.7 MW (0.3%) and mostly attributed to the 0.2% increase in the installed reserve margin target rather than growing demand. Absent the EKPC load, the reliability requirement would still be below that used in the 2014/2015 BRA.

- The Net Cost of New Entry (CONE) values that serve as the basis for price on the RTO and LDA demand curves increased by 3.1% for the RTO, 3.5% in MAAC, 5.1% in EMAAC and PSEG, and 1.2% in ATSI. While the Handy-Whitman Index of Public Utility Construction Cost increased in the range of 8.9% to 9.4% from the 2015/2016 BRA, the overall increase in Net CONE was mitigated by small reduction in gross CONE values associated with the FERC-approved settlement values as

discussed above and an increase in the Energy and Ancillary Service offset due to 2012 net revenues associated with lower gas prices replacing 2009 net revenues that had comparable LMPs but higher gas prices.[1]

- Unlike the 2015/2016 BRA, there were no major shifts in load from or to Fixed Resource Requirement (FRR) plans. There was a small increase in the minimum resource requirements for Annual and Extended Summer resources as a result of FERC's approval of a new test used to establish the reliability targets for the Limited and Extended Summer DR products in docket ER13-486. There was no impact on the auction results as a result of the change in these targets since the new target values impacted only the RTO-wide and MAAC LDA values and the minimum resource requirements did not bind in the RTO or the MAAC LDA. The only change in demand is the inclusion of the EKPC coincident peak load forecast of 2,200 MW which is effectively offset by resources owned or controlled by EKPC that offset the increase in demand.

- The overall net impact of these year-over-year changes is to slightly increase the demand for capacity by shifting the Variable Resource Requirement (VRR) Curve up and to the right, but because the overall effect is relatively small, it was more than offset by the various factors affecting supply in the auction.

Changes that impacted the Supply Curve:

- Since the conclusion of the 2015/2016 BRA 2,710 MW have submitted deactivation notices which is significantly less than the announced retirements prior to the 2015/2016 BRA. Moreover, 1,346 MW of capacity have withdrawn their previous deactivation requests offsetting half of the deactivation requests in the past year. Overall, generator retirements have not had the same effect on reducing supply as was the case leading up to the previous two BRAs. On balance the net retirements had little effect on raising capacity prices. If the incremental retired capacity had not cleared the 2015/2016 BRA, then there would be no incremental effect on supply and market clearing in the 2016/2017 BRA. The withdrawn deactivations lead to increasing supply available to the market and thereby put downward pressure on capacity prices.

- The quantity of Demand Resources offered declined substantially by 5,449 MW UCAP or 27.3% from the DR resources offered last year. Accordingly, the quantity of Demand Resources clearing fell 2,425 MW UCAP or about 16.3%. The reduced pool of supply from Demand Resources, all else equal, places upward pressure on prices.

[1] Refer to 2016/2017 RPM BRA Planning Period Parameters Report and the 2015/2016 RPM Planning Period Report

- In contrast to the trend in Demand Response, Energy Efficiency Resources offered increased by 217 MW or 23% and cleared Energy Efficiency increased 195 MW or 21.1% offsetting a part of the decrease in Demand Resources.

- The 2016/2017 BRA attracted offers 6,597.9 MW of new generation capacity in the form of new facilities and uprates at existing facilities. This amounts to approximately one-half of the capacity that requested, and granted, Competitive Entry and Self-Supply Exemptions. While this new entry figure is about 724 MW less than last year, this deepened pool of supply has the effect of putting downward pressure on clearing prices. Furthermore, unlike the previous version of the MOPR in place for the 2015/2016 BRA, new entry with Competitive Entry and Self Supply Exemptions were not subject to an offer floor that existed under the unit specific exception process which could allow these new entrants to offer at lower prices than last year and possibly accentuate downward price pressures.

- On an unforced capacity (UCAP) basis offered imports increased 90% or 3,558 MW from 3,935 MW to 7,493 MW and the quantity of imports that cleared increased 3,547 MW or 90% to 7,482 MW. The quantity of imports offered and clearing is the highest ever for a BRA and clearly has the effect of increasing supply and placing downward pressure on capacity prices.

- The Avoidable Cost Rate (ACR) default values used a Handy-Whitman indexing method such that the 2016/2017 Delivery Year default ACR data was increased based on the ten-year annual average rate of change in the applicable Handy-Whitman Index of Public Utility Costs. The default ACR values are the default offer caps that suppliers may elect to use in the event the Market Structure Test is failed and the supplier chooses not to calculate a unit-specific ACR data. The offer caps are calculated as the ACR less net revenues. Participants may choose either the technology specific default rate or to calculate their own based on unit-specific data. All else equal, the increase in the ACR values increases the cost of supply and would lead to increasing prices.

- The 2016/2017 BRA procures capacity for the first Delivery Year beyond the compliance deadline plus a possible one year compliance extension to April 16, 2016 for the EPA MATS rule finalized in 2012, and for compliance with the New Jersey High Electricity Demand Day (HEDD) rule that institutes a NOx emission rate standard on intermediate and peaking units in the state goes into effect on May 1, 2015. RPM market rules allow Generation Capacity Resources to reflect in their offers the costs associated with new investment such as environmental retrofits over multiple years. However, if such investments go into service as scheduled for the 2015/2016 Delivery Year, those costs are sunk and not avoidable in subsequent Delivery Years beginning with the 2016/2017 Delivery Year, but could still be represented in offers. The effect of reflecting these costs in offers, to the extent resources do so, has the effect of increasing the cost of supply and by extension increasing capacity prices. If generators opted to reflect the cost of pollution control retrofits beyond the time they would be sunk, these cost would most likely to be reflected in the offers of coal unit subject to MATS and small peakers in New Jersey subject to HEDD.

- Expected net energy market revenues which would go toward offsetting fixed, going forward costs including the costs of new investment in new resources as well as investments in existing resources such as environmental retrofits. As discussed above, the net energy market revenues for gas units has increased and would have the effect of lowering the cost of supply and putting downward pressure on prices. However, recent low energy market prices associated with low gas prices have reduced expected net energy market revenues for coal resources. This increases the capacity market price needed to cover fixed, going forward costs, and consequently puts upward pressure on capacity prices if these resources were need to clear the capacity market to maintain resource adequacy.

Overall Effects on Market Outcomes

On balance, with only a minimal increase in the demand for capacity as represented by VRR Curve, the results of the 2016/2017 BRA have been driven by supply-side effects. Overall, increased supply through new entry, uprates, and a significant increase in imports that overwhelms the decrease in available Demand Resources leading to the $76.63/MW-day decrease in price for Annual Resources in the RTO and $48.33/MW-day decrease for Annual Resources in MAAC. The price decrease in ATSI from $357/MW-day down to $114.23/MW-day for Annual Resources is also driven by the same supply and demand balance in RTO and MAAC, but also is due to the significant transmission investments that have been placed in the RTEP to alleviate reliability criteria violations that resulted from the unprecedented concentration in retirements announced prior to the 2015/2016 BRA.

The only LDA in which prices increased, PSEG, is historically transmission constrained, and did not attract much of the new entry and uprates that are internal to PJM and could not fully benefit from the new entry in other parts of PJM and the increased imports due to the transfer limits into PSEG. Additionally, of the 2,710 MW of announced deactivations since the last BRA, the PSEG zone accounted for 1,408 MW or just over half of the total deactivations in all of PJM since the last BRA, and none of the withdrawn deactivations were located in the PSEG zone. PSEG also experienced a 165 MW decline in cleared Demand Resources that follows the 168 MW decrease in Demand Resources seen in the 2015/2016 BRA.

Finally, there are just over 9,485 MW UCAP (10,195 MW ICAP) of coal-fired capacity that did not clear the BRA. It would seem these coal resources, in addition to needing further investment to continue in commercial operation and possibly reflecting environmental investments that have already been made, may also not be earning sufficient energy market revenues that would keep their capacity market offers lower. Still, with all the competitive new entry, uprates, and imports, these uncleared coal resources were not necessary to reach a record 21.1% installed reserve margin resulting from the 2016/2017 BRA.