



2017/2018 RPM Base Residual Auction Planning Period Parameters

Introduction

The RPM Base Residual Auction (BRA) for the 2017/2018 Delivery Year is scheduled to be conducted in May of 2014. This document describes the 2017/2018 BRA planning period parameters and also provides a comparison of the 2017/2018 BRA planning parameters to those used in the 2016/2017 BRA. The detailed planning parameters spreadsheet is posted on the PJM RPM website under 2017/2018 Delivery Year information.

It should be noted that several of the parameters are dependent on the quantity of load that elects the FRR alternative and are subject to change based on any FRR elections that may be made prior to the March 12, 2014 FRR election deadline.

Reserve Requirement Parameters

The Installed Reserve Margin (IRM) and Forecast Pool Requirement (FPR) represent the level of capacity reserves needed to satisfy the PJM reliability criterion of a Loss of Load Expectation (LOLE) not exceeding one occurrence in ten years. The IRM and FPR represent the same level of required reserves but are expressed in different terms of capacity value. The IRM expresses the required installed capacity reserve as a percent of the forecast peak load, whereas the FPR when multiplied by forecast peak load provides the total unforced capacity required. The FPR is equal to $(1 + \text{IRM})$ times $(1 - \text{Pool-wide Average EFORD})$.

A PJM Reserve Requirement Study is conducted each year to determine the IRM. The reserve requirement parameters to be used in the 2017/2018 BRA are shown in Table 1. For comparison purposes, the values of these parameters used in the 2016/2017 BRA are also shown in Table 1.

Table 1 – Reserve Requirement Parameters for 2016/2017 and 2017/2018 BRAs

Reserve Requirement Parameters	2016/2017 BRA	2017/2018 BRA	Delta
Installed Reserve Margin (IRM)	15.60%	15.70%	0.10%
Pool Wide 5-Year Average EFORD	5.69%	5.65%	-0.04%
Forecast Pool Requirement (FPR)	1.0902	1.0916	0.0014

PJM RTO Region Reliability Requirement

In the RPM clearing process, the PJM RTO Reliability Requirement is used to establish the target reserve level to be procured in an RPM BRA. The PJM RTO Region Reliability Requirement, valued in terms of unforced capacity (UCAP), is the RTO Peak Load Forecast, multiplied by the FPR, less the sum of the Unforced Capacity Obligations of any Fixed Resource Requirement (FRR) Entities in the PJM Region. The PJM RTO Region Reliability Requirement for the 2017/2018 BRA is compared to that of the



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2016/2017 BRA in Table 2. The forecast peak load for the PJM RTO for the 2017/2018 Delivery Year is 164,718 MW. The Reliability Requirement for 2017/2018 prior to adjustment for FRR obligation is the forecast peak load multiplied by the FPR or 179,806 MW.

Table 2 – PJM RTO Reliability Requirement for 2016/2017 and 2017/2018 BRAs

PJM RTO Reliability Requirement Parameters	2016/2017 BRA	2017/2018 BRA	Delta
Forecast Peak Load (MW)	165,412.0	164,717.8	-694.2
Reliability Requirement (UCAP MW)	180,332.2	179,806.0	-526.2
Preliminary FRR Obligation (UCAP MW)	14,204.7	(see Note (1))	--
Preliminary PJM RTO Reliability Requirement adjusted for FRR (UCAP MW)	166,127.5	(see Note (1))	--

NOTE:

(1) Total FRR obligation and PJM RTO Reliability Requirement will be updated and finalized after the March 12, 2014 FRR election deadline.

The FRR alternative provides an LSE with the option to submit a FRR Capacity Plan to meet a fixed capacity resource requirement and avoid direct participation in RPM; therefore, the unforced capacity obligation of FRR entities is not included in the PJM RTO Reliability Requirement used in RPM auctions. The PJM RTO Reliability Requirement for use in the 2017/2018 BRA will be updated and finalized after the March 12, 2014 FRR election deadline.

Locational Deliverability Areas

The process of determining the IRM needed to meet the PJM reliability criterion assumes that the aggregate of all capacity resources can be delivered to the aggregate of all RTO load. This assumption is tested by Load Deliverability Analysis based on the Capacity Emergency Transfer Objective (CETO) and Capacity Emergency Transfer Limit (CETL) tests. These tests are applied to electrical areas called Locational Deliverability Areas (LDAs) within the PJM RTO to ensure that the needed capacity resources are deliverable to load. In the RTEP process, CETL is compared to CETO and transmission upgrades are planned if CETL is below CETO.

Prior to each BRA, the CETO and CETL are calculated for each of twenty-seven potential LDAs that are defined in Schedule 10.1 of the PJM Reliability Assurance Agreement (RAA)¹. Pursuant to Section 5.10 of Attachment DD of the PJM Open Access Transmission

¹ CETO and CETL values were calculated for each of the twenty-seven potential LDAs defined in Schedule 10.1 of the PJM RAA and these values are shown on the detailed planning parameters spreadsheet posted on the PJM RPM website under 2017/2018 Delivery Year information.



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Tariff (OATT), for any Delivery Year, a separate Variable Resource Requirement (VRR) Curve is established for each LDA for which (1) the CETL is less than 1.15 times its CETO; (2) the LDA had a Locational Price Adder in any one or more of the three immediately preceding BRAs; and (3) the MAAC, EMAAC and SWMAAC LDAs are modeled in a BRA regardless of the outcome of the CETL/CETO test or prior BRA results. An LDA not otherwise qualifying under the above three tests may also be modeled if PJM finds that such LDA is determined to be likely to have a Locational Price Adder based on historic offer price levels or if such LDA is required to achieve an acceptable level of reliability consistent with the Reliability Principles and Standards.

Based on an application of the above criteria, the LDAs listed in Table 3 will be modeled in the 2017/2018 BRA. The PS, PS-North and ATSI LDAs will be modeled in the 2017/2018 BRA either because the CETL/CETO ratio for the LDA was less than 1.15 or the LDA had a Locational Price Adder in any one or more of the last three BRAs. Although the remaining LDAs listed in Table 3 neither had a locational price adder in any one of the last three BRAs nor have a CETL/CETO ratio less than 1.15, they will modeled in order to ensure that an acceptable level of reliability is maintained in these LDAs. In determining which LDAs to model in the upcoming BRA for purposes of achieving and maintaining an acceptable level of reliability, PJM gave consideration to potential future generator deactivations in each LDA to more proactively identify locational supply concerns before they actually occur. The ComEd, BGE and PPL LDAs will be modeled in a BRA for the first time.

In RPM, a Reliability Requirement and a separate Variable Resource Requirement (VRR) Curve are established for each LDA that is modeled in the BRA and the LDA CETL acts as a maximum limit on the quantity of capacity that can be imported into the LDA. Table 3 shows the Reliability Requirement and the CETL for each LDA being modeled in the 2017/2018 BRA and compares these values to those used in the 2016/2017 BRA.

As shown in Table 3, LDA reliability requirements for the 2017/2018 BRA are generally consistent with those of the 2016/2017 BRA. Table 3 also shows that LDA CETL values for the 2017/2018 BRA are generally consistent with or slightly higher than those values of the 2016/2017 BRA with the exception of the PEPCO LDA CETL which is significantly lower this year mainly due to the removal from the model of a considerable quantity of capacity in this area that has provided PJM with deactivation notification.



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Table 3 – LDA Reliability Requirements and Capacity Import Limits for 2016/2017 and 2017/2018 BRAs

Locational Deliverability Area	2016/2017 BRA		2017/2018 BRA		Delta	
	Reliability Requirement (UCAP MW)	CETL (UCAP MW)	Reliability Requirement (UCAP MW)	CETL (UCAP MW)	Reliability Requirement (UCAP MW)	CETL (UCAP MW)
MAAC	72,299	6,495	71,804	7,261	-495	766
EMAAC	39,694	8,916	39,371	9,315	-323	399
SWMAAC	17,316	8,342	17,195	8,029	-121	-313
PS	12,870	6,581	12,759	6,700	-111	119
PSNORTH	6,440	2,936	6,465	2,795	25	-141
DPLSOUTH	3,160	1,864	3,215	1,869	55	5
PEPCO	9,012	6,655	8,715	5,208	-297	-1,447
ATSI	16,255	7,881	16,009	8,470	-246	589
Cleveland	6,164	5,245	6,250	4,940	86	-305
COMED	--	--	28,991	7,020	--	--
BGE	--	--	8,961	6,086	--	--
PPL	--	--	10,813	4,336	--	--

Notes: (1) COMED, BGE and PPL LDAs were not modeled in 2016/2017 BRA



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Variable Resource Requirement Curves

A Variable Resource Requirement (VRR) curve is established for the RTO and for each LDA modeled in the BRA. The VRR curve is a demand curve used in the clearing of the BRA that defines the price for a given level of capacity resource commitment relative to the applicable reliability requirement. The VRR curves for the PJM Region and each LDA are based on a target level of capacity and the Net Cost of New Entry (Net CONE).

Target Level of Capacity

The target level of capacity resources to be procured for the PJM RTO Region is the PJM RTO Region Reliability Requirement less the Short Term Resource Procurement Target (STRPT) where the STRPT is equal to 2.5% of the PJM RTO Region Reliability Requirement. The target level of capacity for each LDA is the LDA Reliability Requirement less the STRPT allocated to the LDA where the PJM RTO STRPT is allocated to zones based on the ratio of forecast zonal peak load to forecast PJM RTO peak load adjusted for any FRR load. The target levels of capacity for the RTO and each LDA for the 2017/2018 BRA are shown in Table 5.

Net Cost of New Entry (CONE)

The Net CONE (in UCAP terms) is used in the development of the RTO VRR Curve and the VRR Curve for each modeled LDA. Table 4 shows the CONE values for the PJM RTO and each LDA to be modeled in the 2017/2018 BRA. For comparison purposes, the CONE values used in the 2016/2017 BRA are also shown in Table 4. The gross CONE values for each LDA for 2017/2018 are based on the Gross CONE values used in last year's BRA adjusted by applying the applicable Handy-Whitman index for each CONE area; the Handy-Whitman index was 2.9% for four of the CONE areas and 3% for the fifth CONE area.

The E&AS revenue offset is the annual average of the revenues that would have been received by the reference combustion turbine over a period of the three most recent calendar years. The E&AS revenue values are determined using the peak-hour dispatch method described in section 2.46 of Attachment DD of the PJM OATT. The Net CONE is determined by subtracting the Energy & Ancillary Services (E&AS) offset revenue from the applicable gross CONE value. The Net CONE (in ICAP terms) is divided by [(1 - Pool-wide Average EFORD) multiplied by the number of days in a year] to develop the Net CONE value in \$/MW-Day in UCAP terms.



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Table 4 – Net CONE for PJM RTO and LDAs for 2016/2017 and 2017/2018 BRAs

	2016/2017 BRA				2017/2018 BRA				DELTA	
	CONE	E&AS Offset	Net CONE	Net CONE	CONE	E&AS Offset	Net CONE	Net CONE	Net CONE	Net CONE
	ICAP Terms (\$/MW-Year)	ICAP Terms (\$/MW-Year)	ICAP Terms (\$/MW-Year)	UCAP Terms (\$/MW-Day)	ICAP Terms (\$/MW-Year)	ICAP Terms (\$/MW-Year)	ICAP Terms (\$/MW-Year)	UCAP Terms (\$/MW-Day)	UCAP Terms (\$/MW-Day)	UCAP Terms (%)
RTO	139,392	25,614	113,778	330.53	143,434	22,423	121,011	351.39	20.86	6.3%
MAAC	142,223	46,906	95,317	276.90	146,348	38,559	107,789	313.00	36.10	13.0%
EMAAC,PS, PS-N, DPL-S	152,460	38,885	113,575	329.94	156,881	30,885	125,996	365.87	35.93	10.9%
SWMAAC, PEPCO, BGE	142,223	46,906	95,317	276.90	146,348	38,559	107,789	313.00	36.10	13.0%
COMED, ATSI, Cleveland	139,485	14,652	124,833	362.64	143,670	14,960	128,710	373.75	11.11	3.1%

Table 4 shows that Net CONE values for the 2017/2018 BRA are higher than values used in last year’s BRA by 3.1% to 13.0% depending on the LDA. The 2017/2018 E&AS Offset values differ from those used last year due to an update of the 3-year period for which the reference resource E&AS revenues were determined (the 2017/2018 values are based on LMPs from calendar years 2011 through 2013 whereas the 2016/2017 values were based on LMPs from calendar years 2010 through 2012).

Limited Resource and Sub-Annual Resource Constraints

On 1/30/2014, FERC accepted PJM’s recently filed Tariff revisions that implement maximum constraints on the quantity of the more-limited capacity resources (i.e., Limited and Extended Summer DR) that can be procured in RPM auctions. The revisions will be implemented effective with the 2017/2018 Delivery Year starting with the 2017/2018 BRA. Table 5 shows the target level of capacity (reliability requirement minus the short-term resource procurement target), the Limited Resource Constraint and the Sub-Annual Resource Constraint for the RTO and for each modeled LDA. The Limited DR Constraint is the maximum quantity of Limited DR that may be procured in the BRA. The Sub-Annual DR Constraint is the maximum quantity of the sum of Limited and Sub-Annual DR that may be procured in the BRA.

The calculations of the RTO and LDA Limited and Sub-Annual Resource Constraints are shown on the planning parameters spreadsheet posted on the PJM RPM website under 2017/2018 Delivery Year information and are based on the forecast peak load and



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DR Reliability Target values for the RTO and each LDA. The Limited and Extended Summer DR Reliability Targets are determined each year using FERC-approved procedures and formulae, and represent the maximum quantity of the more-limited capacity products that can be committed to PJM without impairing reliability. With the recently approved Tariff revisions, the DR Reliability Targets will now be utilized in RPM auctions as maximum constraints on the more-limited capacity product types, as opposed to, the prior implementation which utilized the DR Reliability Targets to determine minimum quantities of the less-limited capacity product types.

Table 5 – Target Capacity Levels, Limited DR Constraints and Sub-Annual DR Constraints for 2017/2018 BRA

Locational Area	Target Capacity Level (UCAP MW)	Limited DR Constraint (UCAP MW)	Sub-Annual DR Constraint (UCAP MW)
PJM RTO	175,311	2,530	11,441
MAAC	70,142	2,202	5,496
EMAAC	38,469	1,265	4,842
SWMAAC	16,807	662	1,816
PS	12,473	477	1,795
PS NORTH	6,326	231	670
DPL SOUTH	3,149	83	277
PEPCO	8,531	271	838
ATSI	15,652	351	1,998
ATSI-Cleveland	6,127	120	1,031
COMED	28,351	677	5,824
BGE	8,757	357	949
PL	10,608	217	225

NOTE: Target Capacity Levels and Limited and Sub-Annual DR Constraints are dependent on the quantity of load that elects the FRR alternative and are subject to change based on any FRR elections that may be made prior to the March 12, 2014 FRR election deadline.



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Capacity Import Limits

On 11/29/2013, PJM filed revisions to the RAA and Tariff to recognize limits on the amount of capacity from external resources that PJM can reliably import into the PJM Region. The proposed Tariff revisions included a methodology to determine the practical limits on capacity transfers across external PJM interfaces. PJM proposed to implement the new Capacity Import Limits effective with the 2017/2018 Delivery Year starting with the 2017/2018 BRA. On 1/28/2014, FERC issued a deficiency notice on these filed revisions to which PJM intends to reply within the necessary deadline. A final FERC order by the time of the BRA is uncertain; however, PJM has determined and posted the Capacity Import Limits under the assumption that FERC approval may be received prior to the BRA. If approval is not received in time for implementation in the BRA then the capacity import limits will simply not be reflected in the clearing of the auction. As per the filed revisions, the simultaneous PJM Region Capacity Import Limit and non-simultaneous Capacity Import Limits for five external source-zones have been determined and posted with the BRA planning parameters. The Capacity Import Limits are shown in Table 6.

Table 6 – Capacity Import Limits for 2017/2018 BRA (Subject to FERC Approval)

	Simultaneous PJM Region	External Source-Zone				
		North	West 1	West 2	South 1	South 2
Capacity Import Limit (MW)	6,499	144	3,739	2,865	1,861	1,877



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Summary

- The preliminary forecast peak load for the PJM RTO for the 2017/2018 Delivery Year is 164,718 MW compared to a preliminary forecast peak load of 165,412 MW used in last' years BRA for the 2016/2017 Delivery Year.
- The MAAC, EMAAC, SWMAAC, PS, PSNORTH, PEPCO, DPLSOUTH, ATSI, Cleveland, ComEd, BGE and PPL LDAs will be modeled in the 2017/2018 BRA. The 2017/2018 BRA will include all of the LDAs that were modeled in the 2016/2017 BRA plus the ComEd, BGE and PPL LDAs which will be modeled in a BRA for the first time. Only the MAAC, PS, PS-North and ATSI LDAs have had a Locational Price Adder in any one or more of the last three BRAs and only the PS LDA has a CETL/CETO ratio less than 115%. The remaining LDAs are being modeled in the upcoming BRA to ensure that an acceptable level of reliability is achieved and maintained in these LDAs. In determining which LDAs to model in the upcoming BRA for purposes of achieving and maintaining an acceptable level of reliability, PJM gave consideration to potential future generator deactivations in each LDA to more proactively identify locational supply concerns before they actually occur.
- LDA reliability requirements for the 2017/2018 BRA are generally consistent with and in most cases slightly lower than LDA reliability requirements of the 2016/2017 BRA.
- LDA CETL values for the 2017/2018 BRA are generally consistent with those values of the 2016/2017 BRA with the exception of the PEPCO LDA CETL which is significantly lower this year mainly due to the removal from the model of a considerable quantity of capacity in this area that has provided PJM with deactivation notification.
- Net CONE values for the 2017/2018 BRA are higher than values used in last year's BRA by 3.1% to 13.0% depending on the LDA due to increase in the gross CONE as adjusted by latest Handy-Whitman index and decrease in net E&AS offset. The net E&AS offset values are lower than those from last year due to an update of the 3-year period for which the reference resource E&AS revenues were determined (the 2017/2018 values are based on LMPs from calendar years 2011 through 2013 whereas the 2016/2017 values were based on LMPs from calendar years 2010 through 2012).
- On 1/30/2014, FERC accepted PJM's recently filed Tariff revisions that implement maximum constraints on the quantity of the more-limited capacity resources (i.e., Limited and Extended Summer DR) that can be procured in RPM auctions. The revisions will be implemented effective with the 2017/2018 Delivery Year starting with the 2017/2018 BRA. Table 5 shows the Limited Resource Constraint and the Sub-Annual Resource Constraint for the RTO and for each modeled LDA. Since the



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PPL LDA is a winter-peaking LDA, the Sub-Annual Resource Constraint for the PPL LDA is only slightly higher than the Limited Resource Constraint for PPL.

- On 11/29/2013, PJM filed revisions to the RAA and Tariff to recognize limits on the amount of capacity from external resources that PJM can reliably import into the PJM Region. On 1/28/2014, FERC issued a deficiency notice on these filed revisions to which PJM intends to reply within the necessary deadline. A final FERC order by the time of the BRA is uncertain; however, PJM has determined and posted the Capacity Import Limits shown in Table 6 under the assumption that FERC approval may be received prior to the BRA. If approval is not received in time for implementation in the BRA then the capacity import limits will simply not be reflected in the clearing of the auction.