Updated 2015/2016 RPM Base Residual Auction Planning Period Parameters

Introduction

The RPM Base Residual Auction (BRA) for the 2015/2016 Delivery Year is scheduled to be conducted in May of 2012. A document that describes the 2015/2016 BRA planning period parameters and also provides a comparison of the 2015/2016 BRA planning parameters to those used in the 2014/2015 BRA was posted on February 1, 2012 (See Appendix A). The detailed planning parameters spreadsheet was also posted on the PJM RPM website under 2015/2016 Delivery Year information.

PJM Communication Regarding Planning Parameters

PJM distributed and posted a communication on February 17, 2012 regarding its plans to update the initially posted parameters due to unprecedented generator status uncertainty given the impacts of various environmental regulations. The communication can be found at the following link:

http://pjm.com/markets-and-operations/rpm/~/media/markets-ops/rpm/rpm-auction-info/2015-2016-planning-parameter-update-notification.ashx

Updated Planning Parameters

The updated 2015/2016 RPM Base Residual Auction Planning Parameters were posted on April 6, 2012. The update reflects an additional quantity of load that was elected to be served under Fixed Resource Requirement (FRR) alternative. The total peak load of FRR Entities increased from 902.4 MW as posted on February 1 to 13,267.1 MW. The associated Preliminary FRR Obligation of 14,406.7 MW was subtracted from the RTO Reliability Requirement of 177,184.1 MW. The balance of RTO Reliability Requirement of 162,777.4 MW was used to develop the Variable Resource Requirement Curve for the RTO.

In addition, the updated Planning Parameters include several updated assumptions related to deactivation notifications. Since February 1, 2012 over 8,500 MW additional deactivation notifications throughout PJM have been received.

CETO / Reliability Requirement Updates

The indicated CETO changes in the revised parameters are due to the announced generator retirements. The CETO increases by roughly the UCAP amount of the generator deactivations. This increase is offset in some cases by the addition of interconnection queue projects that have executed an Interconnection Service Agreement since the February 1, 2012 posting.

The Reliability Requirements are relatively unchanged from the February 1, 2012 posting because the Reliability Requirement is largely independent of the amount of generation in an LDA.

CETL Updates

PJM transmission system reinforcements are currently under development for many of the deactivation notifications. Upgrades that are planned to be in-service by the 2015/16 delivery year are included in this study. In addition to the planned system reinforcements, several units may be requested to operate beyond their indicated deactivation date to maintain system reliability until the system reinforcements are placed in-service. System reinforcements include several proposed synchronous condenser conversions that will provide reactive support (MVAR) but not real power (MW). All other announced generator retirements with the exception of those that may still possibly be needed to run past their deactivation dates were reflected in the model.

Of particular interest is the updated information for ATSI zone. ATSI CETO value increased from 4,990 MW to 5,280 MW and the Reliability Requirement dropped from 16,240 MW to 16,201 MW. The CETL value increased from 3,517 MW (70% of CETO) to 5,418 MW (103% of CETO) due to additional transmission upgrades.

The associated transmission upgrades will be presented to the Transmission Expansion Advisory Committee (TEAC) at the April 12, 2012 TEAC meeting.

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Appendix A

ORIGINAL REPORT – FEBRUARY 1, 2012

Introduction

The RPM Base Residual Auction (BRA) for the 2015/2016 Delivery Year is scheduled to be conducted in May of 2012. This document describes the 2015/2016 BRA planning period parameters and also provides a comparison of the 2015/2016 BRA planning parameters to those used in the 2014/2015 BRA. The detailed planning parameters spreadsheet is posted on the PJM RPM website under 2015/2016 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 2, 2012 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 + IRM) times (1-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 2015/2016 BRA are shown in Table 1. For comparison purposes, the values of these parameters used in the 2014/2015 BRA are also shown in Table 1.

Table 1 – Reserve Requirement Parameters for 2014/2015 and 2015/2016 BRAs

Reserve Requirement Parameters	2014/2015 BRA	2015/2016 BRA	Delta
Installed Reserve Margin (IRM)	15.30%	15.40%	0.10%
Pool Wide 5-Year Average EFORd	6.25%	5.90%	-0.35%
Forecast Pool Requirement (FPR)	1.0809	1.0859	0.0050

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 2015/2016 BRA is compared to that of the 2014/2015 BRA in Table 2. The forecast peak load for the PJM RTO for the 2015/2016 Delivery Year is 163,168.0 MW. The Reliability Requirement for 2015/2016 prior to adjustment for FRR obligation is the forecast peak load multiplied by the FPR or 177,184.1 MW.

Table 2 – PJM RTO Reliability Requirement for 2014/2015 and 2015/2016 BRAs

PJM RTO Reliability Requirement Parameters	2014/2015 BRA	2015/2016 BRA	Delta
Forecast Peak Load (MW)	164,757.6	163,168.0	-1,589.6
Reliability Requirement (UCAP MW)	178,086.5	177,184.1	-902.4
Preliminary FRR Obligation (UCAP MW)	29,763.4	979.9 (see Note (1))	--
Preliminary PJM RTO Reliability Requirement adjusted for FRR (UCAP MW)	148,323.1	176,204.2 (see Note (1))	--

NOTE:

(1) 979.9 MW represents obligation associated with FRR load still in 5-year FRR commitment period. Total FRR obligation and PJM RTO Reliability Requirement will be updated and finalized after the March 2, 2012 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 2015/2016 BRA will be updated and finalized after the March 2, 2012 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 potential LDA. An LDA with a CETL less than 1.15 times its CETO is modeled as an LDA in the upcoming BRA. In addition, an LDA is modeled in the upcoming BRA if the LDA had a Locational Price Adder in any one or more of the three immediately preceding BRAs. 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 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 MAAC, EMAAC, SWMAAC, PS, PSNORTH, DPLSOUTH, PEPCO and ATSI LDAs will be modeled in the 2015/2016 BRA. The CETL to CETO ratio for each LDA is greater than 1.15 with the exception of the ATSI LDA[1]. With a CETL to CETO ratio below the 1.15 threshold, the ATSI LDA will be modeled for the first time in the 2015/2016 BRA. The CETO and CETL values of the ATSI LDA were impacted by the removal of about 2,200 MW of generation located in ATSI zone that has provided PJM with a notification of intent to deactivate. The PSNORTH, DPLSOUTH and PEPCO LDAs will be modeled because these LDAs had a Locational Price Adder in at least one of the past three BRAs. Although the CETL to CETO ratio of the PS LDA exceeds 1.15 and the LDA has not experienced a Locational Price Adder in any of the last three BRAs, PJM will model the PS LDA in the upcoming BRA due to uncertainty associated with potential HEDD (High Electric Demand Day) rules covering the operations of high emitting generation during certain peak hours and because the PS CETL is dependent on the in-service date of several key planned transmission reinforcements.

In RPM, a Reliability Requirement and a 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 2015/2016 BRA and compares these values to those used in the 2014/2015 BRA. Changes in LDA reliability requirements are primarily driven by changes in LDA peak load. Changes in LDA CETL are primarily driven by changes in transmission system topology including the addition or removal of transmission facilities and changes in the load distribution profile within a zone or region. The CETL of an LDA may also be impacted by the addition or retirement of generation facilities.

[1] The CETO and CETL value for each of the 25 LDAs is shown on the detailed planning parameters spreadsheet posted on the PJM RPM website under 2015/2016 Delivery Year information. The CETL to CETO ratio is greater than 1.15 for all LDAs except for the ATSI LDA.

Table 3 – LDA Reliability Requirements and Capacity Import Limits for 2014/2015 and 2015/2016 BRAs

	2014/2015 BRA		2015/2016 BRA		Delta	
Locational Deliverability Area	Reliability Requirement (UCAP MW)	CETL (UCAP MW)	Reliability Requirement (UCAP MW)	CETL (UCAP MW)	Reliability Requirement (UCAP MW)	CETL (UCAP MW)
MAAC	72,187	5,694	71,601	7,750	-586	2,056
EMAAC	39,995	8,189	39,394	8,853	-601	664
SWMAAC	17,358	7,719	17,212	8,475	-146	757
PS	13,099	5,721	12,802	6,192	-297	471
PSNORTH	6,211	2,372	6,331	2,970	120	598
DPLSOUTH	3,018	1,925	3,081	1,824	63	-101
PEPCO	8,951	5,606	8,936	5,973	-15	367
ATSI	--	--	16,240	3,517	--	--

Note: ATSI LDA was not modeled in 2014/2015 BRA

As shown in Table 3, the changes in LDA reliability requirements are relatively small and the reliability requirements for the 2015/2016 BRA are generally lower than those of the 2014/2015 BRA. The general decrease in reliability requirement is mainly due to lower peak load forecasts.

Table 3 shows that LDA CETL values for the 2015/2016 BRA are generally higher than those of the 2014/2015 BRA. The primary factors driving the CETL changes are discussed below:

- The increase in CETL for the MAAC, SWMAAC and PEPCO LDAs is mainly attributable to several 2011 RTEP projects which add reactive support at the Loudon, Pleasant View and Doubs 500 kV substations and the rebuild of the Mt Storm-Doubs 500 kV line. The additional reactive support alleviates voltage problems in the Meadowbrook 500 kV area and the

rebuild of the Mt Storm-Doubs 500 kV line redistributed flow off of the Pleasant View-Edwards Ferry 230 kV line which limited imports in last year's model.

- The increase in CETL for the PS and PSNORTH LDAs is mainly attributable to the 138 kV to 230 kV conversions of circuits between Roseland and Hudson. The 138 kV to 230 kV voltage conversions of circuits between Roseland and Hudson reduce flow on the Cedar Grove F-Clifton K 230 kV line which limited imports into the PS and PSNORTH LDAs in last year's model.

- The increase in CETL for EMAAC is mainly attributable to the addition of the PPL portion of the Susquehanna-Roseland 500 kV line. The addition of this line redistributed flow off of the Rock Springs-Keeney 500 kV line which limited imports into EMAAC in last year's model.

- The ATSI LDA was not modeled in the 2014/2015 BRA because the CETL to CETO ratio was greater than 1.15. In the 2015/2016 model, for the ATSI LDA, the CETO increased as compared to the 2014/2015 model due to the removal of several generators totaling about 2,200 MW that have notified PJM of their intent to deactivate. The CETL for the ATSI LDA decreased primarily due to the loss of reactive support associated with the deactivating generation.

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.

Net Cost of New Entry (CONE)

Updated 2015/2016 RPM Base Residual Auction Planning Period Parameters

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 2015/2016 BRA. For comparison purposes, the CONE values used in the 2014/2015 BRA are also shown in Table 4. The gross CONE values for each LDA area is updated each year by multiplying the values used in the previous year's BRA by the latest one-year change in the applicable Handy-Whitman Index. Using this approach, gross CONE values are 2.4% higher than the gross CONE values used in last year's BRA (the gross CONE for ATSI LDA is based on the gross CONE of CONE area 3 which is 2.0% higher than last year). 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.

Table 4 – Net CONE for PJM RTO and LDAs for 2014/2015 and 2015/2016 BRAs

	2014/2015 BRA				2015/2016 BRA				DELTA	
	CONE ICAP Terms ($/MW-Year)	E&AS Offset ICAP Terms ($/MW-Year)	Net CONE ICAP Terms ($/MW-Year)	Net CONE UCAP Terms ($/MW-Day)	CONE ICAP Terms ($/MW-Year)	E&AS Offset ICAP Terms ($/MW-Year)	Net CONE ICAP Terms ($/MW-Year)	Net CONE UCAP Terms ($/MW-Day)	Net CONE UCAP Terms ($/MW-Day)	Net CONE UCAP Terms (%)
RTO	128,226	11,119	117,107	342.23	131,303	20,877	110,426	320.63	-21.60	-6.3%
MAAC	128,226	45,446	82,780	241.91	131,303	39,136	92,167	267.61	25.7	10.6%
EMAAC	138,646	44,538	94,108	275.02	141,973	33,885	108,088	313.84	38.82	14.1%
SWMAAC	128,226	45,446	82,780	241.91	131,303	39,136	92,167	267.61	25.7	10.6%
PS	138,646	44,538	94,108	275.02	141,973	33,885	108,088	313.84	38.82	14.1%
PS NORTH	138,646	44,538	94,108	275.02	141,973	33,885	108,088	313.84	38.82	14.1%
DPL SOUTH	138,646	44,538	94,108	275.02	141,973	33,885	108,088	313.84	38.82	14.1%
PEPCO	128,226	45,446	82,780	241.91	131,303	39,136	92,167	267.61	25.7	10.6%
ATSI	NA	NA	NA	NA	134,314	10,940	123,374	358.22	--	--

Table 4 shows that Net CONE values for the 2015/2016 BRA for the EMAAC LDA and the LDAs contained within EMAAC are 14.1% higher than values used in last year's BRA; the Net CONE value for the 2015/2016 BRA for the MAAC LDA, SWMAAC LDA and the PEPCO LDA are 10.6% higher than values used in last year's BRA; and the Net CONE value for the 2015/2016 BRA for the RTO is 6.3% lower than the value used in last year's BRA.

The 2015/2016 gross CONE values differ from those used last year based on an escalation of last year's values by the one-year change in the applicable Handy-Whitman Index. The 2015/2016 E&AS Offset values differ from those used last year primarily due to an update of the 3-year period for which the reference resource E&AS revenues were determined (the 2015/2016 values are based on LMPs from calendar years 2009 through 2011 whereas the 2014/2015 values were based on LMPs from calendar years 2008 through 2010). The updated E&AS offset values also reflect a change in the peak-hour dispatch methodology. Starting with the 2015/2016 BRA, the peak-hour dispatch method first dispatches and commits the reference resource against day-ahead energy market LMPs and then against real-time energy market LMPs if day-ahead LMPs do not support a day-ahead commitment. Prior to the 2015/2016 BRA, the peak-hour dispatch method dispatched and committed the reference resource against real-time energy market LMPs only.

Minimum Resource Requirements

Starting with the 2014/2015 Delivery Year, two additional demand resource products were established. The Annual Demand Resource product is one that is available throughout the year and the Extended Summer Demand Resource product is one that is available with an expanded summer commitment period. These new products have fewer limitations than the Limited Demand Resource product. Prior to each auction, PJM determines the maximum reliable contribution of the more limited demand resources to the PJM region and each modeled LDA. The maximum contribution levels are implemented and enforced in each RPM auction as a minimum requirement on the commitment of less limited products.

The Extended Summer Demand Resource Reliability Target is the maximum amount of Extended Summer Demand Resources that can be procured in an auction assuming PJM procures resources in the auction equal to the level of the Reliability Requirement. The target is expressed as a percentage of the forecast peak load and converted to UCAP MW so that it can be deducted from the Reliability Requirement to determine the Minimum Annual Resource Requirement. The Minimum Annual Resource Requirement is the minimum amount of capacity sought to be procured from Annual Resources. Annual Resources include generation capacity resources, energy efficiency resources and annual demand resources. A Minimum Annual Resource Requirement is established for the RTO and for each modeled LDA.

The Limited Demand Resource Reliability Target is the maximum amount of Limited Demand Resources that can be procured in an auction assuming PJM procures resources in the auction equal to the level of the Reliability Requirement. The target is expressed as a

percentage of the forecast peak load and converted to UCAP MW so that it can be deducted from the Reliability Requirement to determine the Minimum Extended Summer Resource Requirement. The Minimum Extended Summer Resource Requirement is the minimum amount of capacity sought to be procured from Extended Summer Demand Resources and Annual Resources. A Minimum Extended Summer Resource Requirement is established for the RTO and for each modeled LDA.

Table 5 shows the target level of capacity (reliability requirement minus the short-term resource procurement target), the minimum annual resource requirement and the minimum extended summer resource requirement for the RTO and each modeled LDA. Note that the Target Reserve Level and Minimum Resource Requirements for the RTO are preliminary and will be updated and finalized after the March 2, 2012 FRR election deadline. Minimum Resource Requirement values are based on the forecast peak load and DR Reliability Target Values (and the CETL in the case of LDA Minimum Resource Requirements) so changes in Minimum Resource Requirements are driven by changes in any and all of these parameters. Also, the changes in LDA Minimum Resource Requirements shown in Table 5 reflect a recent FERC-approved methodology change. For the 2015/2016 BRA, the LDA Minimum Resource Requirements are not reduced by the LDA short-term resource procurement target as they were for the 2014/2015 BRA.

Table 5 – Target Capacity Levels and Minimum Resource Requirements for 2014/2015 and 2015/2016 BRAs

	2014/2015 BRA			2015/2016 BRA			Delta		
Locational Deliverability Area	Target Capacity Level (UCAP MW)	Minimum Annual Resource Requirement (UCAP MW)	Minimum Extended Summer Resource Requirement (UCAP MW)	Target Capacity Level (UCAP MW)	Minimum Annual Resource Requirement (UCAP MW)	Minimum Extended Summer Resource Requirement (UCAP MW)	Target Capacity Level (UCAP MW)	Minimum Annual Resource Requirement (UCAP MW)	Minimum Extended Summer Resource Requirement (UCAP MW)
RTO	144,615	128,450	137,809	171,799	158,535	168,127	27,184	30,085	30,318
MAAC	70,520	57,749	61,255	69,942	55,866	60,239	-578	-1,882	-1,016
EMAAC	39,085	25,397	28,773	38,490	24,777	28,470	-594	-620	-303
SWMAAC	16,969	7,152	8,402	16,828	6,536	7,842	-141	-616	-560
PS	12,804	4,977	6,374	12,514	4,616	5,894	-291	-362	-480
PSNORTH	6,077	2,813	3,382	6,193	2,532	3,018	116	-282	-365
DPLSOUTH	2,954	654	887	3,015	911	1,117	61	257	230
PEPCO	8,762	1,898	2,729	8,750	1,712	2,544	-12	-186	-185
ATSI	NA	NA	NA	15,879	12,021	12,145	--	--	--

NOTE: Target Capacity Levels and Minimum Resource Requirements 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 2, 2012 FRR election deadline. RTO values of Table 5 are significantly lower for the 2014/2015 BRA since the 2014/2015 values reflect final FRR elections made for the 2014/2015 Delivery Year and Final FRR elections for the 2015/2016 Delivery Year will not be known until after the FRR election deadline.

Summary

- The preliminary forecast peak load for the PJM RTO for the 2015/2016 Delivery Year is 163,168 MW.
- Primarily due to a lower load forecast, LDA reliability requirements for the 2015/2016 BRA are lower than LDA reliability requirements for the 2014/2015 BRA.
- LDA CETL values for the 2015/2016 BRA are generally higher than those of the 2014/2015 BRA:
    - The increase in CETL for the MAAC, SWMAAC and PEPCO LDAs is mainly attributable to several 2011 RTEP projects which add reactive support at the Loudon, Pleasant View and Doubs 500 kV substations and the rebuild of the Mt Storm-Doubs 500 kV line.
    - The increase in CETL for the PS and PSNORTH LDAs is mainly attributable to the 138 kV to 230 kV conversions of circuits between Roseland and Hudson.
    - The increase in CETL for EMAAC is mainly attributable to the addition of the PPL portion of the Susquehanna-Roseland 500 kV line.
- The ATSI LDA will be modeled in the 2015/2016 BRA since the CETL to CETO was less than the 1.15 threshold. In the 2015/2016 model, for the ATSI LDA, the CETO increased as compared to the 2014/2015 model due to the removal of several generators totaling about 2,200 MW that have notified PJM of their intent to deactivate. The CETL for the ATSI LDA decreased primarily due to the loss of reactive support associated with the deactivating generation.
- Net CONE values for the 2015/2016 BRA for the EMAAC LDA and the LDAs contained within EMAAC are 14.1% higher than values used in last year's BRA; the Net CONE value for the 2015/2016 BRA for the MAAC LDA, SWMAAC LDA and the PEPCO LDA are 10.6% higher than values used in last year's BRA; and the Net CONE value for the 2015/2016 BRA for the RTO is 6.3% lower than the value used in last year's BRA.