

EE Addback Education

MIC

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IMM



Monitoring Analytics

EE Enters the PJM Capacity Market

- On March 26, 2009, FERC approved Tariff and RAA changes to allow EE Resources to participate in PJM Capacity Markets beginning with the Base Residual Auction conducted in May 2009 which committed capacity for the 2012/2013 Delivery Year.
- FERC approved PJM's request to allow EE Resource participation beginning June 1, 2011, in the remaining 2011/2012 Incremental Auctions by letter order dated January 22, 2010 in Docket No. ER10-366-000.

EE Originally Not Included in the Load Forecast

- **The requirements for Energy Efficiency Resource participation in PJM Capacity Markets are in Tariff, Attachment DD-1 and RAA, Schedule 6, Section L.**
- **The only reason that EE was included in the capacity market in the first place was that EE was asserted to not be included in the PJM load forecast used in the capacity market.**
- **PJM stated that EE was not fully reflected in the load forecast for four years based on the method in place at the time.**

PJM Filing to Include EE (ER09-412)

- **“An EE Resource is permitted to be offered as a Capacity Resource in the Base Residual or Incremental Auctions for four (4) consecutive Delivery Years. [fn omitted] As discussed above, this ensures that a party contemplating an energy efficiency investment realizes the benefit of the investment’s reduction in the PJM region’s capacity needs before that reduction can be reflected in the load forecast used for RPM’s forward auctions. After that reduction is reflected in the load forecast, the customer’s load obligation, and capacity requirements, are reduced even without the changes proposed in this docket.”**

PJM Filing to Include EE (ER09-412)

- **“However, as explained above, by the fourth Delivery Year the measure is in place, PJM’s load forecast will fully incorporate the measure’s capacity reduction benefits. Continuing to make a capacity payment to the project sponsor under those circumstances would represent a double-payment for the measure’s benefits: once in the form of a foregone capacity payment by the sponsor, and then again the form of an affirmative payment to the sponsor.”**

PJM Filing to Include EE (ER09-412)

- **“This double counting would also have an adverse impact on reliability because the installed reserves provided by energy efficiency would be counted as a resource in the RPM auction and again as a load forecast reduction. This would create the potential for a shortfall in procurement of installed reserves, which would violate reliability criteria.”**
- **PJM filed on 12.28.2008.**

March 2009 FERC Order Approving EE in RPM

- **“PJM states that, while currently RPM permits participation by demand resources that are dispatchable by PJM, the reliability value of non-dispatchable resources, such as EE, is recognized within RPM only after the impact of the EE resources is reflected in the historic load data. RPM's Base Residual Auction is conducted three years before the Delivery Year, but it relies on forecasts based on peak loads from the summer before the auction, i.e., four years before the Delivery Year.” (Order at P120)**

March 2009 FERC Order Approving EE in RPM

- **“In addition, PJM’s proposal corrects a mismatch between EE-related load reductions and capacity requirement levels. As PJM has explained, there is a four year lag after an EE resource is initially installed before its load-reducing effects are reflected in PJM’s load forecast and the associated installed reserve requirement for the Delivery Year.” (Order at P132)**

March 2009 FERC Order Approving EE in RPM

- **“To address this gap, PJM has proposed tariff revisions in a new section M to schedule 6 of its Reliability Assurance Agreement, which otherwise deals with the participation of demand resources in RPM. PJM proposes to allow energy efficiency resources that clear in the RPM auction to receive RPM capacity payments for up to four consecutive Delivery Years.” (Order at P121)**
- **“After that reduction is reflected in the load forecast, the customer's load obligation and capacity requirements are reduced to reflect the reduction in the region's capacity needs.” (Order at P122, fn 56)**

EE Incorporated in Load Forecast

- **Revisions to the PJM load forecast to incorporate energy efficiency were endorsed at the November 19, 2015, MRC.**
 - **These revisions included improvements to comprehensively capture energy efficiency impacts through incorporation of projections from the U.S. Energy Information Administration (EIA) Annual Energy Outlook (AEO).**
 - **The AEO forecast is based on a set of end use models for the residential, commercial, and industrial sectors.**
 - **EIA accounts for state and utility efficiency programs by mapping regional EE program expenditures to end uses and tracks the number of units sold and associated efficiency information on an ongoing basis.**

OATT Attachment DD-1

An Energy Efficiency Resource is a project, including installation of more efficient devices or equipment or implementation of more efficient processes or systems, exceeding then-current building codes, appliance standards, or other relevant standards, designed to achieve a continuous (during peak summer and winter periods as described herein) reduction in electric energy consumption at the End-Use Customer's retail site **that is not reflected in the peak load forecast prepared for the Delivery Year for which the Energy Efficiency Resource is proposed**, and that is fully implemented at all times during such Delivery Year, without any requirement of notice, dispatch, or operator intervention. (Approved in March 26, 2009 Order.)



EE Should Have Been Removed at that Time

- **As soon as PJM explicitly included EE in the load forecast used in the capacity market, PJM should have followed its tariff language and logic and eliminated EE from the capacity market construct entirely.**

Rather than EE Removal – Addback Introduced

- **PJM did not eliminate EE from the capacity market construct when EE included in PJM forecasts.**
- **PJM did eliminate EE from the capacity market.**
- **PJM removed EE from capacity resource status.**
- **PJM defined a way to continue to pay EE the capacity market clearing price while excluding EE from the capacity market.**
- **That calculation method (the addback method) was intended to allow payment to EE of the capacity market clearing price but eliminate any price impact of EE on the capacity auctions.**

Addback

- **PJM documented the addback method in Manual 18 on December 17, 2015, but retained the tariff language that required the complete removal of EE from the capacity market.**
- **PJM implemented the addback method to reflect the inclusion of EE in the peak load forecast for the capacity market in 2016 for delivery years 2016/2017 and forward.**

Corrected Addback Method

- The MMU pointed out that the addback method, as implemented, did affect capacity market prices and recommended a modification in the calculation method.
- The corrected EE addback method was adopted for the 2023/2024 Delivery Year.
- The method uses an iterative approach to ensure a match between the EE paid and the addback, and therefore no price impact.

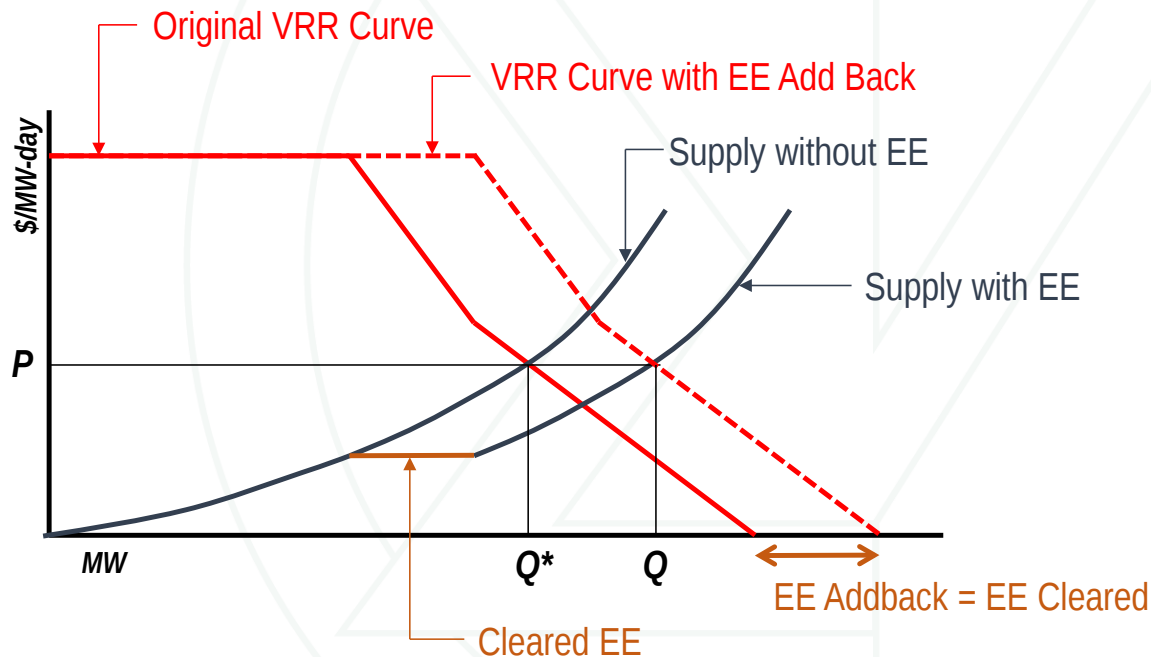
Initial Addback Quantity

- **“For each auction, the Reliability Requirement of the RTO and each affected LDA will be increased by the total UCAP Value of all EE Resource(s) for which PJM accepted an EE M&V Plan for that auction, and upon which PJM created an EE Resource to be offered into that upcoming auction.”**
- **Manual 18, Section 2.4.5**

Addback for BRAs and IAs

- **BRA: “The increase in the Reliability Requirement is accomplished in each BRA by shifting the VRR Curve of the RTO and each affected LDA to the right by the MW quantity of the increase.”**
- **IA: “The increase in the Reliability Requirement is accomplished in each IA by the submittal of a PJM Buy Bid in each affected LDA with the buy bid MW quantity set equal to the increase.”**
- **Manual 18, page 26, fn 9.**

Illustration of BRA Clearing with EE Addback



Q^* : Total Cleared without EE (UCAP MW)

Q : Total Cleared with EE (UCAP MW)

P : Clearing Price ($\$/\text{MW-day}$)

Example: 2024/2025 BRA Planning Parameters

	Reliability Requirement adjusted for FRR	Gross CONE, \$/MW-Day (UCAP Price)	Net CONE, \$/MW-Day (UCAP Price)	EE Addback (UCAP)	Variable Resource Requirement Curve before EE Addback:						Variable Resource Requirement Curve after EE Addback:					
					Point (a) UCAP Price, \$/MW-Day	Point (b) UCAP Price, \$/MW-Day	Point (c) UCAP Price, \$/MW-Day	Point (a) UCAP Level, MW	Point (b) UCAP Level, MW	Point (c) UCAP Level, MW	Point (a) UCAP Price, \$/MW-Day	Point (b) UCAP Price, \$/MW-Day	Point (c) UCAP Price, \$/MW-Day	Point (a) UCAP Level, MW	Point (b) UCAP Level, MW	Point (c) UCAP Level, MW
RTO	132,055.7	\$348.94	\$293.19	7,668.7	\$439.79	\$219.89	\$0.00	130,674.1	134,243.2	141,035.9	\$439.79	\$219.89	\$0.00	138,342.8	141,911.9	148,704.6
MAAC	63,518.0	\$351.93	\$294.06	3,393.8	\$441.09	\$220.55	\$0.00	62,853.5	64,570.2	67,837.4	\$441.09	\$220.55	\$0.00	66,247.3	67,964.0	71,231.2
EMAAC	35,415.0	\$355.14	\$312.39	1,906.7	\$468.59	\$234.29	\$0.00	35,044.5	36,001.6	37,823.3	\$468.59	\$234.29	\$0.00	36,951.2	37,908.3	39,730.0
SWMAAC	14,299.0	\$357.45	\$261.07	766.2	\$391.61	\$195.80	\$0.00	14,149.4	14,535.9	15,271.4	\$391.61	\$195.80	\$0.00	14,915.6	15,302.1	16,037.6
PS	11,166.0	\$355.14	\$321.21	676.5	\$481.82	\$240.91	\$0.00	11,049.2	11,351.0	11,925.3	\$481.82	\$240.91	\$0.00	11,725.7	12,027.5	12,601.8
PS NORTH	5,715.0	\$355.14	\$321.21	329.5	\$481.82	\$240.91	\$0.00	5,655.2	5,809.7	6,103.6	\$481.82	\$240.91	\$0.00	5,984.7	6,139.2	6,433.1
DPL SOUTH	3,153.0	\$355.14	\$284.11	99.8	\$426.17	\$213.08	\$0.00	3,120.0	3,205.2	3,367.4	\$426.17	\$213.08	\$0.00	3,219.8	3,305.0	3,467.2
PEPCO	7,151.0	\$357.45	\$288.07	387.6	\$432.11	\$216.05	\$0.00	7,076.2	7,269.5	7,637.3	\$432.11	\$216.05	\$0.00	7,463.8	7,657.1	8,024.9
ATSI	14,434.0	\$341.33	\$279.35	579.6	\$419.03	\$209.51	\$0.00	14,283.0	14,673.1	15,415.6	\$419.03	\$209.51	\$0.00	14,862.6	15,252.7	15,995.2
TSI-Cleveland	5,374.0	\$341.33	\$279.35	54.9	\$419.03	\$209.51	\$0.00	5,317.8	5,463.0	5,739.5	\$419.03	\$209.51	\$0.00	5,372.7	5,517.9	5,794.4
COMED	23,859.0	\$341.33	\$302.76	1,063.3	\$454.14	\$227.07	\$0.00	23,609.4	24,254.2	25,481.5	\$454.14	\$227.07	\$0.00	24,672.7	25,317.5	26,544.8
BGE	7,514.0	\$357.45	\$234.07	378.6	\$357.45	\$175.55	\$0.00	7,435.4	7,638.5	8,025.0	\$357.45	\$175.55	\$0.00	7,814.0	8,017.1	8,403.6
PL	10,214.0	\$341.83	\$297.25	379.1	\$445.88	\$222.94	\$0.00	10,107.1	10,383.2	10,908.6	\$445.88	\$222.94	\$0.00	10,486.2	10,762.3	11,287.7
DAYTON	3,922.0	\$341.33	\$262.17	127.0	\$393.26	\$196.63	\$0.00	3,881.0	3,987.0	4,188.7	\$393.26	\$196.63	\$0.00	4,008.0	4,114.0	4,315.7
DEOK	6,589.1	\$341.33	\$268.26	183.9	\$402.39	\$201.20	\$0.00	6,520.2	6,698.3	7,037.2	\$402.39	\$201.20	\$0.00	6,704.1	6,882.2	7,221.1

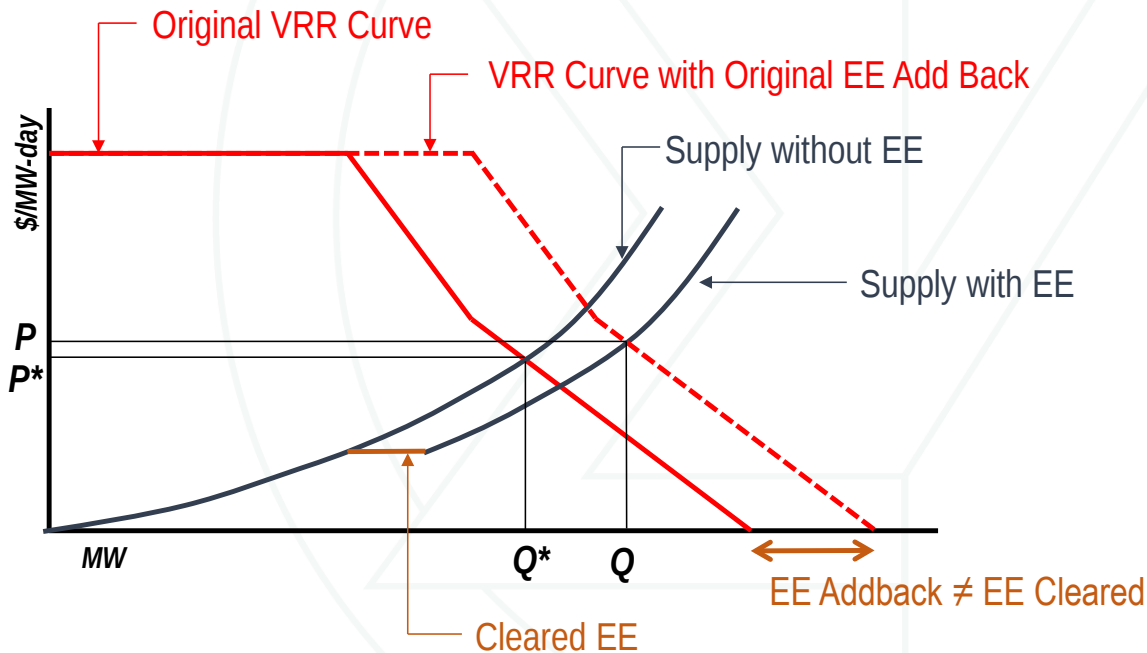
VRR Curve values are prior to adjustment for PRD

Iterative Solution

- If a first pass auction solution clears fewer EE Resource MW than the amount by which the Reliability Requirement of the RTO and each affected LDA was increased, the clearing price would increase.
- In the next iteration, the Reliability Requirement increase of the RTO and each affected LDA will be reduced such that it is set equal to the cleared EE MW quantity of the first pass auction solution and the auction is solved again.
- Iterations continue until the cleared EE MW match the shift in the Reliability Requirement (the addback quantity).

Illustration of BRA Clearing with EE Addback

First Pass



Q^* : Total Cleared without EE (UCAP MW)

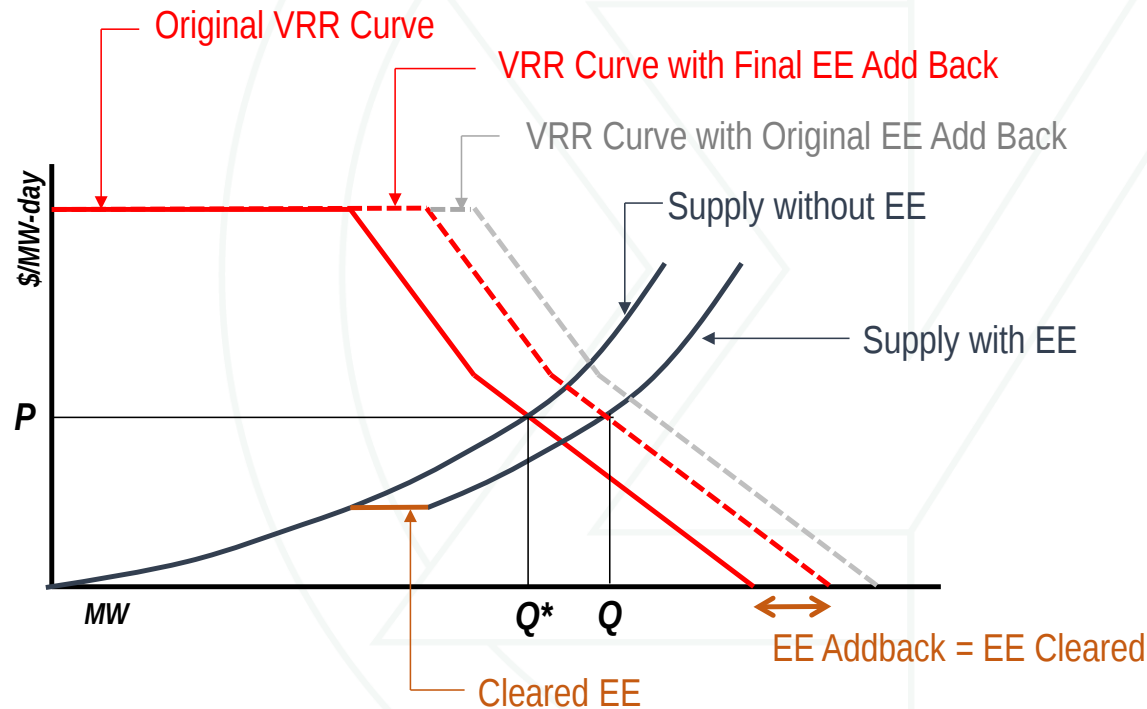
Q : Total Cleared with EE (UCAP MW)

P^* : Clearing Price without EE (\$/MW-day)

P : Clearing Price with EE (\$/MW-day)

Illustration of BRA Clearing with EE Addback

Final Pass



Q*: Total Cleared without EE (UCAP MW)

Q: Total Cleared with EE (UCAP MW)

P: Clearing Price (\$/MW-day)

Result is Subsidy Paid through Uplift

- **The result of the current EE addback method is that there is no impact on the capacity market clearing price.**
- **Customers do pay for the cleared quantity of EE at market clearing prices as an uplift payment that provides a subsidy to EE sellers.**

Impact of EE

- The inclusion of sell offers for EE, with the EE addback mechanism, had a significant impact on the auction results, but not on the auction clearing prices.
- The total RPM market revenues for the 2024/2025 RPM Base Residual Auction were \$2,192,828,251.
- If there were no offers for EE and the EE addback MW were removed in the 2024/2025 RPM BRA and everything else had remained the same, total RPM market revenues for the 2024/2025 RPM BRA would have been \$2,073,286,830, a decrease of \$119,541,421, or 5.5 percent, compared to the actual results.

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