



Monitoring  
Analytics

**Analysis of Replacement Capacity for  
RPM Commitments:  
June 1, 2007 to June 1, 2019**

**The Independent Market Monitor for PJM  
September 13, 2019**

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## Introduction

The Market Monitor, in State of the Market Reports, reports on total demand resources (DR) cleared in RPM auctions for specific delivery years compared to the level of DR available in each delivery year. This report includes the results of a more comprehensive analysis by the Market Monitor of the extent to which all types of capacity resources clear in RPM auctions and are available during delivery years. When a capacity resource is not available for a delivery year, the owner of the capacity resource may purchase replacement capacity. Replacement capacity is the vehicle used to offset any reduction in capacity from a resource which is not available for a delivery year. But the replacement capacity mechanism may also be used to manipulate the market. This report is an update to the prior Market Monitor reports on replacement capacity.<sup>1 2 3 4</sup> This report includes data through June 1, 2019, modified versions of tables included in the prior reports, and additional tables.

Cleared sell offers and make whole MW in RPM auctions are binding commitments to provide capacity for the relevant delivery year.<sup>5 6</sup> Replacement capacity can be used to fulfill a capacity resource commitment and avoid deficiency and penalty charges.<sup>7 8</sup> The

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<sup>1</sup> See “Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1 2011,” (December 11, 2012). <[http://www.monitoringanalytics.com/reports/Reports/2012/IMM\\_Report\\_Replacement\\_Capacity\\_Activity\\_20121211.pdf](http://www.monitoringanalytics.com/reports/Reports/2012/IMM_Report_Replacement_Capacity_Activity_20121211.pdf)>.

<sup>2</sup> See “Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1 2013,” (September 12, 2013). <[http://www.monitoringanalytics.com/reports/Reports/2013/IMM\\_Report\\_on\\_Capacity\\_Replacement\\_Activity\\_2\\_20130913.pdf](http://www.monitoringanalytics.com/reports/Reports/2013/IMM_Report_on_Capacity_Replacement_Activity_2_20130913.pdf)>.

<sup>3</sup> See “Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1 2016,” (December 27, 2016). <[http://www.monitoringanalytics.com/reports/Reports/2016/IMM\\_Analysis\\_of\\_Replacement\\_Capacity\\_for\\_RPM\\_Commitments\\_06012007\\_to\\_06012016\\_20161227.pdf](http://www.monitoringanalytics.com/reports/Reports/2016/IMM_Analysis_of_Replacement_Capacity_for_RPM_Commitments_06012007_to_06012016_20161227.pdf)>.

<sup>4</sup> See “Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1 2017,” (December 14, 2017). <[http://www.monitoringanalytics.com/reports/Reports/2017/IMM\\_Report\\_on\\_Capacity\\_Replacement\\_Activity\\_4\\_20171214.pdf](http://www.monitoringanalytics.com/reports/Reports/2017/IMM_Report_on_Capacity_Replacement_Activity_4_20171214.pdf)>.

<sup>5</sup> “PJM Manual 18: PJM Capacity Market,” § 5.4.1 Resource-Specific Sell Offer Requirements, Rev. 42 (July 25, 2019).

<sup>6</sup> See definition of Capacity Resource in PJM Reliability Assurance Agreement among Load-Serving Entities in the PJM Region, Article 1. See also PJM Reliability Assurance Agreement among Load-Serving Entities in the PJM Region Schedule 6, 9, & 10.

<sup>7</sup> “PJM Manual 18: PJM Capacity Market,” § 8.8 Replacement Resources, Rev. 42 (July 25, 2019).

RPM rules addressing the need to purchase replacement capacity in RPM incremental auctions (IAs) list only reasons related to physical reductions in the capacity of the sold resources:

The need to purchase replacement Capacity Resources may arise for any reason, including but not limited to resource retirement, resource cancellation or construction delay, resource derating, EFORd increase, a decrease in the Nominated Demand Resource Value of a Planned Demand Resource, delay or cancellation of a Qualifying Transmission Upgrade, or similar occurrences.<sup>9</sup>

The RPM rules do not define qualifying reasons for approval of replacement capacity transactions, except in the case of early replacement transactions. Capacity market sellers do not have to identify the reasons for purchasing replacement capacity.<sup>10</sup>

Prior to July 23, 2015, replacement capacity transactions could be completed only after the EFORds for the delivery year were finalized, on November 30 in the year prior to the delivery year, but before the start of the delivery day.<sup>11</sup>

Effective July 23, 2015, replacement transactions may be requested for defined reasons and completed before EFORds for the delivery year are finalized, November 30 prior to the delivery year, but before the start of the delivery day.<sup>12</sup> Effective July 23, 2015, within three business days after a Performance Assessment Interval (PAI), a capacity market seller may request a retroactive replacement capacity transaction. The retroactive replacement transaction must satisfy the rules regarding location and temporal availability, the replacement resource must have already been in the same subaccount

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<sup>8</sup> OATT Attachment DD (Reliability Pricing Model) § 8.1.

<sup>9</sup> OATT Attachment DD § 5.4(d).

<sup>10</sup> There are other potential reasons capacity market sellers could utilize replacement capacity, including opportunities to commit a specific unit to a Fixed Resource Requirement (FRR) capacity plan or to export capacity from a specific unit from PJM. These were not analyzed in this report.

<sup>11</sup> “PJM Manual 18: PJM Capacity Market,” § 8.8 Replacement Resources, Rev. 42 (July 25, 2019).

<sup>12</sup> An issue charge on the timing of replacement transactions was presented by Citigroup Energy, Inc. and endorsed at the November 7, 2014, meeting of the PJM Market Implementation Committee. The stakeholder process resulted in the PJM proposal being approved and presented to the PJM Markets and Reliability Committee. The related rule changes in the PJM proposal were endorsed at the July 23, 2015, meeting of the PJM Markets and Reliability Committee.

(PJM account used for settlement purposes) as the resource being replaced on the relevant delivery day, and the replacement resource must have been included in the same PAI as the resource being replaced.<sup>13</sup> Effective May 26, 2016, language was added to the replacement resources section of PJM Manual 18 which was intended to allow early replacement transactions using cleared incremental auction buy bids without any justification, but it was later determined that it could not be implemented as this language was superseded by the early replacement capacity transaction rules implemented on July 23, 2015.<sup>14</sup> Effective November 17, 2016, the early replacement capacity transaction rule effective July 23, 2015, was removed, leaving only the early replacement capacity transaction rule effective May 26, 2016, meaning that early replacement transactions could be completed using cleared incremental auction buy bids without providing any reasons.<sup>15</sup> The Market Monitor filed a complaint on November 22, 2016, requesting that the prior rules be reinstated.<sup>16</sup> Effective December 22, 2016, the early replacement capacity transaction rule effective July 23, 2015, was reinstated with some modifications.<sup>17</sup> Effective December 22, 2016, the Market Monitor filed to withdraw its complaint.<sup>18</sup>

Replacement capacity can be from a range of sources: cleared buy bids in RPM incremental auctions; available, uncommitted capacity from capacity resources within a capacity market seller's portfolio; excess commitment credits for the 2010/2011 Delivery Year forward; Excess Interruptible Load for Reliability (ILR) MW Credits for the 2009/2010 through 2011/2012 delivery years; and locational UCAP transactions with

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<sup>13</sup> This rule change was endorsed as part of revisions to "PJM Manual 18: PJM Capacity Market" related to Capacity Performance at the July 23, 2015, meeting of the PJM Markets and Reliability Committee.

<sup>14</sup> A motion to add this language to PJM Manual 18 was presented by Citigroup Energy, Inc. at the April 28, 2016, meeting of the Markets and Reliability Committee. This PJM Manual 18 change was endorsed at the May 26, 2016, meeting of the PJM Markets and Reliability Committee.

<sup>15</sup> Citigroup Energy, Inc. presented proposed revisions to the early replacement transactions rules in PJM Manual 18 at the October 27, 2016, meeting of the PJM Markets and Reliability Committee. These PJM Manual 18 changes were endorsed at the November 17, 2016, meeting of the PJM Markets and Reliability Committee.

<sup>16</sup> *Complaint of the Independent Market Monitor for PJM*, Docket No. EL17-23-000 (November 22, 2016).

<sup>17</sup> Markets and Reliability Committee meeting of December 22, 2016.

<sup>18</sup> *Notice of Withdrawal of Complaint of the Independent Market Monitor for PJM*, Docket No. EL17-23-000 (December 22, 2016).

another capacity market seller.<sup>19 20 21</sup> Replacement capacity must be located in the same modeled locational deliverability area (LDA) or the same parent LDA if there are no constraints, meaning there is remaining import capability after accounting for all auction results for that delivery year and any approved replacement transactions which affect the remaining import capability. Resources located in a constrained child LDA can serve as replacement capacity for resources located in a parent LDA. For the 2014/2015 through 2019/2020 delivery years, replacement capacity resources must have the same or better temporal availability characteristics (product types). Replacement capacity resources for capacity performance (CP) resource commitments must be CP eligible. Replacement capacity used to reduce DR commitments must be specified for no less than the balance of the delivery year.<sup>22</sup> Effective with the 2019/2020 Delivery Year, available capacity from an EE resource can be used to replace only EE resource commitments.<sup>23</sup>

The following related RPM market rule changes were implemented during the period analyzed:

- For the 2007/2008 and 2008/2009 delivery years, the RPM rules did not permit certified ILR to be withdrawn after certification.
- For the 2009/2010 through 2011/2012 delivery years, certified ILR could withdraw at any time up until one day prior to the start of the delivery year.<sup>24</sup>
- For the 2007/2008, 2008/2009, and 2010/2011 delivery years, the deadline for ILR certification was three months prior to the start of the delivery year.

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<sup>19</sup> Effective with the 2010/2011 Delivery Year, Excess Commitment Credits are allocated to Load Serving Entities (LSEs) that are charged a Locational Reliability Charge when the PJM Reliability Requirement decreases resulting in excess procured capacity. See OATT Attachment DD § 5.12(b)(viii).

<sup>20</sup> For the 2009/2010 through the 2011/2012 delivery years, Excess ILR MW Credits are allocated to LSEs that are charged a Locational Reliability Charge when the certified ILR exceeds the Forecast ILR Obligation for the LDA, provided the amount does not exceed the ratio of increase in load charges divided by the Final Zonal ILR Price within the LDA. See OATT Attachment DD § 5.13.

<sup>21</sup> OATT Attachment DD § 5.3A.

<sup>22</sup> "PJM Manual 18: PJM Capacity Market," § 8.8 Replacement Resources, Rev. 42 (July 25, 2019).

<sup>23</sup> This rule change and related EE add back rule changes were endorsed at the December 17, 2015, meeting of the PJM Markets and Reliability Committee.

<sup>24</sup> See 126 FERC ¶ 61,275 at P 200(B) (2009).

- For the 2009/2010 Delivery Year, the deadline for ILR certification was May 1, 2009, or one month prior to the start of the delivery year.<sup>25</sup>
- For the 2011/2012 Delivery Year, the ILR certification deadline changed from three months to two months prior to the start of the delivery year.<sup>26</sup>
- Effective with the 2012/2013 Delivery Year, the ILR demand side product was eliminated.<sup>27</sup>
- Effective with the 2012/2013 Delivery Year, the Short Term Resource Procurement Target (STRPT) and the related RPM incremental auction redesign were implemented.
- Effective March 27, 2009, the penalty structure changed, including a revision to the daily deficiency rate.<sup>28</sup> The prior daily deficiency rate was equal to the higher of two times the seller's weighted average resource clearing price for the resource or the net cost of new entry in an LDA. The revised daily deficiency rate is equal to the seller's weighted average resource clearing price for the resource plus the higher of 0.20 times the seller's weighted average resource clearing price for the resource or \$20 per MW-day.
- Effective with the 2012/2013 Delivery Year, the reporting and compliance provisions of the emergency load response program were revised.<sup>29</sup> For Guaranteed Load Drop (GLD) end-use customers, the calculation of load reduction for event and test compliance was revised to be capped at the end-use customer's Peak Load Contribution (PLC).
- Effective with the 2014/2015 Delivery Year, revised generating unit capability verification procedures were implemented.<sup>30</sup> These changes included the requirement that hydro and pumped storage perform rating tests during the summer verification window; and the requirement that all generators, with the exception of hydro, pumped storage, and diesel, adjust ratings tests for ambient

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<sup>25</sup> See 126 FERC ¶ 61,275 at P 89 (2009).

<sup>26</sup> See PJM Interconnection, L.L.C., Letter Order in Docket No. ER10-366-000 (January 22, 2010).

<sup>27</sup> See 126 FERC ¶ 61,275 at P 38 (2009).

<sup>28</sup> See 126 FERC ¶ 61,275 at P 180 (2009).

<sup>29</sup> 138 FERC ¶ 61,138 (2012).

<sup>30</sup> This rule change was endorsed at the February 27, 2014, meeting of the PJM Markets and Reliability Committee.

conditions.<sup>31</sup> Effective May 1, 2019, generating capability testing is required within defined temperature limits.

- Effective with the 2015/2016 Delivery Year, a demand resource must be able to fully respond to a load management event within 30 minutes of notification from PJM.<sup>32 33</sup> Prior to the 2015/2016 Delivery Year, curtailment service providers (CSPs) could elect a notification time of 30, 60, or 120 minutes.
- Effective July 23, 2015, replacement transactions may be requested for defined reasons and completed before EFORs for the delivery year are finalized, November 30 prior to the delivery year, but before the start of the delivery day.
- Effective July 23, 2015, within three business days of a PAI, a capacity market seller may request a retroactive replacement capacity transaction. The transaction must satisfy the rules regarding location and temporal availability and must have already been in the same account as the resource being replaced on the relevant delivery day.
- For the 2017/2018 through the 2019/2020 delivery years, capacity import limits (CILs) were established for each of the five external source zones and the overall PJM region to account for the risk that external generation resources may not be able to deliver energy during the relevant delivery year due to the curtailment of firm transmission by third parties.<sup>34</sup>
- Effective May 9, 2017, enhanced pseudo tie requirements for external generation capacity resources were implemented, including a transition period with deliverability requirements for existing pseudo tie resources that have previously cleared an RPM auction.<sup>35</sup>
- Effective December 17, 2015, an EE add back mechanism and related changes were implemented to accommodate EE Resource participation on the supply side.<sup>36</sup>
- Effective for the 2018/2019 and subsequent delivery years, the extended summer and limited DR products were eliminated. For a transition period during the 2018/2019

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<sup>31</sup> “PJM Manual 21: PJM Capacity Market,” § 1.2.1 Determining Rated Capability (Rated ICAP, Claimed Installed Capacity, etc.), Rev. 14 (August 1, 2019). “PJM Manual 21: PJM Capacity Market,” § 2.2 Summer Net Corrected Test Capability, Rev. 14 (August 1, 2019).

<sup>32</sup> See OATT Attachment DD-1 § A.2 and OATT Attachment DD § 5.14C.

<sup>33</sup> 147 FERC ¶ 61,103 (2014).

<sup>34</sup> 147 FERC ¶ 61,060 (2014).

<sup>35</sup> 161 FERC ¶ 61,197 (2017).

<sup>36</sup> These rule changes were endorsed at the December 17, 2015, meeting of the PJM Markets and Reliability Committee.



and 2019/2020 delivery years, PJM procured two product types, capacity performance and base capacity. Effective for the 2018/2019 and the 2019/2020 delivery years, a base capacity demand resource constraint and a case capacity resource constraint, replacing the sub-annual resource constraint and limited resource constraint, were established for each modeled LDA. These maximum quantities were set for reliability purpose to limit the quantity procured of the inferior products, including base capacity generation resources, base capacity demand resources, and base capacity energy efficiency resources. Effective with the 2020/2021 Delivery Year, PJM procures a single capacity product, capacity performance. CP Resources are expected to be available and capable of providing energy and reserves when needed at any time during the delivery year.

- Effective for the 2018/2019 and subsequent delivery years, the short term resource procurement target was eliminated.
- Effective January 1, 2019, demand resource registration rules were modified to define a summer and winter nominated value for a CP registration and to change the method to determine the daily nominated value of a demand resource as the lesser of the sum of the underlying summer registrations or the sum of the underlying winter registrations.<sup>37</sup>

## Analysis

The following resource classifications are used in this report: all capacity resources, generation resources, internal generation resources, internal generation resources that are in service, internal generation resources that are not in service, external generation resources, demand resources (DR), and energy efficiency (EE) Resources.<sup>38 39</sup> For this analysis, generation resources are defined as not in service for a delivery year if the resource was not in service at the time of its initial offer in an RPM auction for the delivery year. This distinction is designed to provide insights into whether replacement behavior differed between resources in service and not in service at the time of the initial offer. As replacement capacity can vary on a daily basis, the data presented in this report are for a single day each year, June 1 of each year from 2007 through 2019.<sup>40</sup>

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<sup>37</sup> 165 FERC ¶ 61,281 (2018).

<sup>38</sup> FRR commitments are not included in this report.

<sup>39</sup> RPM data for energy efficiency resources are not available prior to the 2011/2012 Delivery Year. The energy efficiency resource type was eligible to be offered in RPM auctions beginning with the 2012/2013 Delivery Year and also for RPM incremental auctions in the 2011/2012 Delivery Year.

<sup>40</sup> Delivery years are from June 1 through May 31.

## ***RPM Commitments and Replacements***

Table 1 through Table 8 show the following information for the identified resource classifications:

- RPM Cleared. Cleared sell offers and make whole MW in RPM auctions for the given delivery year.<sup>41</sup>
- Adjustments to Cleared. Changes to RPM cleared MW quantity after the auction results were posted due to:
  - DR cleared MW may be reduced for Relief from Capacity Resource Deficiency Charges due to the permanent departure of the associated load from the system.<sup>42</sup>
  - Generation cleared MW may have been reduced for the 2014/2015, 2015/2016, and 2016/2017 delivery years due to the Generating Unit Capability Verification Test Requirements Transition Provision.<sup>43</sup>
  - DR cleared MW may have been reduced for the 2015/2016 and 2016/2017 delivery years due to the Demand Response Operational Resource Flexibility Transition Provision.<sup>44</sup>
  - DR cleared MW may have been reduced for the 2016/2017, 2017/2018, and 2018/2019 delivery years due to the Demand Response Legacy Direct Load Control Transition Provision.<sup>45</sup>
- Net Replacements. RPM commitment additions, including Locational UCAP transactions, less RPM commitment reductions using replacement capacity.<sup>46</sup>
- RPM Commitments. RPM cleared capacity and adjustments plus Net Replacements.

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<sup>41</sup> The reported cleared MW for the 2016/2017 and 2017/2018 delivery years, unless otherwise specified, reflect the cleared MW in the capacity performance transition incremental auctions and the associated reductions in the cleared MW for any prior RPM auction for those delivery years. See OATT. Attachment DD § 5.14D.

<sup>42</sup> OATT Attachment DD § 8.4.

<sup>43</sup> OATT Attachment DD § 5.14B.

<sup>44</sup> OATT Attachment DD § 5.14C.

<sup>45</sup> OATT Attachment DD § 5.14E.

<sup>46</sup> Pursuant to PJM Operating Agreement § 15.1.6(c), PJM Settlement shall attempt to close out and liquidate forward capacity commitments for PJM Members that are declared in collateral default. The replacement transactions reported for the 2014/2015 Delivery Year include transactions associated with RTP Controls, Inc. which was declared in collateral default on March 9, 2012.

- RPM Commitment Shortages. A failure to satisfy an RPM commitment for which replacement capacity was not obtained and for which Daily Capacity Resource Deficiency Charges are assessed.

For any identified resource classification, net replacements include all the capacity for which RPM commitments were replaced (negative) plus capacity from that identified resource classification used to replace capacity commitments (positive). For example, Table 12 shows the total RPM commitments for generation resources which were replaced for June 1, 2019, were 17,157.4 MW and the total RPM commitment additions on generation resources which were used as replacement resources for June 1, 2019, were 7,045.9 MW, with the result that net replacements were 10,111.5 MW.

For net replacements, the replacement capacity provided from an identified resource classification that is used to replace capacity in the same resource classification nets to zero, regardless of the owners of the resources, assuming locational UCAP based replacement transactions are fully utilized. Therefore, for any identified resource classification, net replacements include all the capacity for which RPM commitments were replaced from a replacement source other than that identified resource classification (negative) plus capacity from that identified resource classification used to replace capacity commitments from another resource classification (positive). For example, the net replacements of 10,111.5 MW for generation resources for June 1, 2019 (Table 12), equals replacement capacity using cleared buy bids (10,020.4 MW from Table 12), replacement capacity using excess commitment credits (345.6 MW from Table 12), locational UCAP based replacement capacity for demand resources (-243.8 MW from Table 17), and unutilized locational UCAP (-10.7 MW).

Table 1 includes this information for all capacity resources. Table 2 through Table 6 include this information for generation resources. Table 2 includes information for all generation resources while Table 3 through Table 6 include this information for subcategories of generation resources. Table 7 includes this information for demand resources and the MW of registered DR. A demand resource with RPM commitments and, prior to the 2012/2013 delivery year, certified ILR, must be registered in the Pre-Emergency or Emergency Load Response Program prior to the start of the relevant delivery year.<sup>47</sup> Table 8 includes information for energy efficiency resources.

For example, in Table 2, of the 163,832.6 adjusted cleared MW (RPM Cleared plus Adjustments to Cleared) of generation resources for the 2019/2020 Delivery Year, 10,111.5 MW of RPM commitments for generation resources were replaced by purchases in RPM incremental auctions, by some other resource type, or excess commitment

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<sup>47</sup> "PJM Manual 18: PJM Capacity Market," § 4.3.1 Requirements of Load Management Products in RPM, Rev. 42 (July 25, 2019).

credits, after accounting for some generation resources being used to replace other resource types.

**Table 1 RPM commitments for all capacity resources: June 1, 2007 to June 1, 2019<sup>48</sup>**

	UCAP (MW)			RPM Commitments	RPM Commitment Shortages	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements			
01-Jun-07	129,409.2	0.0	0.0	129,409.2	(8.1)	129,401.1
01-Jun-08	130,629.8	0.0	(766.5)	129,863.3	(246.3)	129,617.0
01-Jun-09	134,030.2	0.0	(2,068.2)	131,962.0	(14.7)	131,947.3
01-Jun-10	134,036.2	0.0	(4,179.0)	129,857.2	(8.8)	129,848.4
01-Jun-11	134,182.6	0.0	(6,717.6)	127,465.0	(79.3)	127,385.7
01-Jun-12	141,295.6	(11.7)	(9,400.6)	131,883.3	(157.2)	131,726.1
01-Jun-13	159,844.5	0.0	(12,235.3)	147,609.2	(65.4)	147,543.8
01-Jun-14	161,214.4	(9.4)	(13,615.9)	147,589.1	(1,208.9)	146,380.2
01-Jun-15	173,845.5	(326.1)	(11,849.4)	161,670.0	(1,822.0)	159,848.0
01-Jun-16	179,773.6	(24.6)	(16,157.5)	163,591.5	(924.4)	162,667.1
01-Jun-17	180,590.5	0.0	(13,982.7)	166,607.8	(625.3)	165,982.5
01-Jun-18	175,996.0	0.0	(12,057.8)	163,938.2	(150.5)	163,787.7
01-Jun-19	177,064.2	0.0	(12,300.3)	164,763.9	(9.3)	164,754.6

**Table 2 RPM commitments for generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)			RPM Commitments	RPM Commitment Shortages	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements			
01-Jun-07	129,281.6	0.0	0.0	129,281.6	(8.1)	129,273.5
01-Jun-08	130,070.4	0.0	(726.5)	129,343.9	(187.9)	129,156.0
01-Jun-09	133,137.3	0.0	(1,593.5)	131,543.8	(0.4)	131,543.4
01-Jun-10	133,073.3	0.0	(3,662.7)	129,410.6	(1.1)	129,409.5
01-Jun-11	132,279.6	0.0	(5,665.4)	126,614.2	(79.3)	126,534.9
01-Jun-12	131,876.9	0.0	(7,112.1)	124,764.8	(117.2)	124,647.6
01-Jun-13	148,160.7	0.0	(9,041.5)	139,119.2	(21.4)	139,097.8
01-Jun-14	145,193.7	(9.4)	(7,088.8)	138,095.5	(989.3)	137,106.2
01-Jun-15	156,881.1	(5.0)	(7,355.6)	149,520.5	(1,759.3)	147,761.2
01-Jun-16	164,765.7	(5.2)	(11,417.9)	153,342.6	(468.5)	152,874.1
01-Jun-17	166,797.5	0.0	(10,307.5)	156,490.0	(587.6)	155,902.4
01-Jun-18	162,264.3	0.0	(9,124.2)	153,140.1	(149.5)	152,990.6
01-Jun-19	163,832.6	0.0	(10,111.5)	153,721.1	(8.9)	153,712.2

<sup>48</sup> The reported RPM commitment shortages for June 1, 2017, were revised from the *Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1, 2017*.

**Table 3 RPM commitments for internal generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)			RPM Commitments	RPM Commitment Shortages	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements			
01-Jun-07	127,660.8	0.0	0.0	127,660.8	(8.1)	127,652.7
01-Jun-08	128,444.0	0.0	(715.7)	127,728.3	(187.9)	127,540.4
01-Jun-09	131,415.2	0.0	(1,827.8)	129,587.4	(0.4)	129,587.0
01-Jun-10	130,952.3	0.0	(3,445.7)	127,506.6	(1.1)	127,505.5
01-Jun-11	130,457.6	0.0	(5,651.0)	124,806.6	(79.3)	124,727.3
01-Jun-12	130,360.4	0.0	(6,988.8)	123,371.6	(60.8)	123,310.8
01-Jun-13	145,732.2	0.0	(8,562.3)	137,169.9	(21.4)	137,148.5
01-Jun-14	141,515.8	(9.4)	(6,277.2)	135,229.2	(989.3)	134,239.9
01-Jun-15	151,528.2	(5.0)	(7,515.5)	144,007.7	(1,735.8)	142,271.9
01-Jun-16	157,004.8	(5.2)	(8,479.5)	148,520.1	(467.1)	148,053.0
01-Jun-17	161,816.5	0.0	(10,043.2)	151,773.3	(587.6)	151,185.7
01-Jun-18	157,485.8	0.0	(8,311.0)	149,174.8	(149.5)	149,025.3
01-Jun-19	161,014.7	0.0	(9,665.5)	151,349.2	(8.9)	151,340.3

**Table 4 RPM commitments for internal generation resources in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)			RPM Commitments	RPM Commitment Shortages	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements			
01-Jun-07	127,614.0	0.0	0.0	127,614.0	(8.1)	127,605.9
01-Jun-08	128,334.1	0.0	(707.2)	127,626.9	(182.8)	127,444.1
01-Jun-09	130,930.7	0.0	(2,030.3)	128,900.4	(0.4)	128,900.0
01-Jun-10	130,251.4	0.0	(3,403.1)	126,848.3	(1.1)	126,847.2
01-Jun-11	127,769.6	0.0	(4,871.1)	122,898.5	(2.2)	122,896.3
01-Jun-12	127,361.1	0.0	(7,055.9)	120,305.2	(13.2)	120,292.0
01-Jun-13	141,712.5	0.0	(8,082.8)	133,629.7	(21.4)	133,608.3
01-Jun-14	138,240.4	(9.4)	(6,304.1)	131,926.9	(365.2)	131,561.7
01-Jun-15	146,096.4	(5.0)	(6,656.8)	139,434.6	(395.5)	139,039.1
01-Jun-16	147,892.8	(5.2)	(6,137.9)	141,749.7	(121.6)	141,628.1
01-Jun-17	148,243.0	0.0	(5,881.3)	142,361.7	(50.5)	142,311.2
01-Jun-18	142,540.7	0.0	(4,354.3)	138,186.4	(11.0)	138,175.4
01-Jun-19	145,197.4	0.0	(8,972.1)	136,225.3	(8.9)	136,216.4

**Table 5 RPM commitments for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)			RPM Commitments	RPM Commitment Shortages	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements			
01-Jun-07	46.8	0.0	0.0	46.8	0.0	46.8
01-Jun-08	109.9	0.0	(8.5)	101.4	(5.1)	96.3
01-Jun-09	484.5	0.0	202.5	687.0	0.0	687.0
01-Jun-10	700.9	0.0	(42.6)	658.3	0.0	658.3
01-Jun-11	2,688.0	0.0	(779.9)	1,908.1	(77.1)	1,831.0
01-Jun-12	2,999.3	0.0	67.1	3,066.4	(47.6)	3,018.8
01-Jun-13	4,019.7	0.0	(479.5)	3,540.2	0.0	3,540.2
01-Jun-14	3,275.4	0.0	26.9	3,302.3	(624.1)	2,678.2
01-Jun-15	5,431.8	0.0	(858.7)	4,573.1	(1,340.3)	3,232.8
01-Jun-16	9,112.0	0.0	(2,341.6)	6,770.4	(345.5)	6,424.9
01-Jun-17	13,573.5	0.0	(4,161.9)	9,411.6	(537.1)	8,874.5
01-Jun-18	14,945.1	0.0	(3,956.7)	10,988.4	(138.5)	10,849.9
01-Jun-19	15,817.3	0.0	(693.4)	15,123.9	0.0	15,123.9

**Table 6 RPM commitments for external generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)			RPM Commitment	RPM Commitments Less
	RPM Cleared	Adjustments to Cleared	Net Replacements	Shortages	Commitment Shortages
01-Jun-07	1,620.8	0.0	0.0	1,620.8	1,620.8
01-Jun-08	1,626.4	0.0	(10.8)	1,615.6	1,615.6
01-Jun-09	1,722.1	0.0	234.3	1,956.4	1,956.4
01-Jun-10	2,121.0	0.0	(217.0)	1,904.0	1,904.0
01-Jun-11	1,822.0	0.0	(14.4)	1,807.6	1,807.6
01-Jun-12	1,516.5	0.0	(123.3)	1,393.2	1,336.8
01-Jun-13	2,428.5	0.0	(479.2)	1,949.3	1,949.3
01-Jun-14	3,677.9	0.0	(811.6)	2,866.3	2,866.3
01-Jun-15	5,352.9	0.0	159.9	5,512.8	5,489.3
01-Jun-16	7,760.9	0.0	(2,938.4)	4,822.5	4,821.1
01-Jun-17	4,981.0	0.0	(264.3)	4,716.7	4,716.7
01-Jun-18	4,778.5	0.0	(813.2)	3,965.3	3,965.3
01-Jun-19	2,817.9	0.0	(446.0)	2,371.9	2,371.9

**Table 7 RPM commitments and registrations for demand resources: June 1, 2007 to June 1, 2019<sup>49</sup>**

	UCAP (MW)						Registered DR		
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments	RPM Commitment Shortages	RPM Commitments Less Commitment Shortages	ICAP (MW)	UCAP Conversion Factor	UCAP (MW)
01-Jun-07	127.6	0.0	0.0	127.6	0.0	127.6	0.0	1.03260	0.0
01-Jun-08	559.4	0.0	(40.0)	519.4	(58.4)	461.0	488.0	1.03426	504.7
01-Jun-09	892.9	0.0	(474.7)	418.2	(14.3)	403.9	570.3	1.03308	589.2
01-Jun-10	962.9	0.0	(516.3)	446.6	(7.7)	438.9	572.8	1.03455	592.6
01-Jun-11	1,826.6	0.0	(1,052.4)	774.2	0.0	774.2	1,117.9	1.03455	1,156.5
01-Jun-12	8,752.6	(11.7)	(2,253.6)	6,487.3	(34.9)	6,452.4	7,443.7	1.03690	7,718.4
01-Jun-13	10,779.6	0.0	(3,314.4)	7,465.2	(30.5)	7,434.7	8,240.1	1.04208	8,586.8
01-Jun-14	14,943.0	0.0	(6,731.8)	8,211.2	(219.4)	7,991.8	8,923.4	1.04234	9,301.2
01-Jun-15	15,774.8	(321.1)	(4,829.7)	10,624.0	(61.8)	10,562.2	10,946.0	1.03783	11,360.0
01-Jun-16	13,284.7	(19.4)	(4,800.7)	8,464.6	(455.4)	8,009.2	8,961.2	1.04154	9,333.4
01-Jun-17	11,870.7	0.0	(3,870.8)	7,999.9	(30.3)	7,969.6	8,681.4	1.03857	9,016.3
01-Jun-18	11,435.4	0.0	(3,182.4)	8,253.0	(1.0)	8,252.0	8,512.0	1.09050	9,282.4
01-Jun-19	10,703.1	0.0	(2,138.8)	8,564.3	(0.4)	8,563.9	9,229.9	1.08950	10,056.0

<sup>49</sup> Registered DR data are not available from PJM for the 2007/2008 Delivery Year.

**Table 8 RPM commitments for energy efficiency resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)			RPM Commitment Shortages	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements		
01-Jun-07	0.0	0.0	0.0	0.0	0.0
01-Jun-08	0.0	0.0	0.0	0.0	0.0
01-Jun-09	0.0	0.0	0.0	0.0	0.0
01-Jun-10	0.0	0.0	0.0	0.0	0.0
01-Jun-11	76.4	0.0	0.2	76.6	76.6
01-Jun-12	666.1	0.0	(34.9)	631.2	626.1
01-Jun-13	904.2	0.0	120.6	1,024.8	1,011.3
01-Jun-14	1,077.7	0.0	204.7	1,282.4	1,282.2
01-Jun-15	1,189.6	0.0	335.9	1,525.5	1,524.6
01-Jun-16	1,723.2	0.0	61.1	1,784.3	1,783.8
01-Jun-17	1,922.3	0.0	195.6	2,117.9	2,110.5
01-Jun-18	2,296.3	0.0	248.8	2,545.1	2,545.1
01-Jun-19	2,528.5	0.0	(50.0)	2,478.5	2,478.5

The gross replacements are the total RPM commitments for the identified resource classification that were replaced. The net replacements are the net amounts of the identified resource classification which were replaced, after accounting for the fact that some resources in the same identified resource classification were used as replacement capacity. The gross replacement value is the best measure of the total amount of capacity for an identified resource classification that was replaced in a year. The net replacement value is a measure of the extent to which an overall resource classification was replaced.

Table 9 shows the ratio of net replacement capacity to cleared capacity for each of the identified resource classifications.<sup>50</sup> Of the identified resource classifications, the ratio of net replacement capacity to cleared capacity was highest for DR on average. Beginning in 2009/2010 and continuing through 2015/2016, the share of net replacement for DR RPM commitments was the highest of the categories by a substantial amount. The share of net replacement capacity for demand resource RPM commitments was the highest of the categories for June 1, 2019. The share of DR net replacement activity declined after the termination of the ILR product on June 1, 2012.<sup>51</sup> The share of net replacement capacity for DR RPM commitments was more than 50 percent on June 1, 2009, 2010 and 2011 and 20 or more percent on June 1, 2012, through June 1, 2019. The next highest resource classification share of net replacement capacity on average was for external generation resources. The ratio of net replacement capacity to cleared capacity for

<sup>50</sup> The adjusted cleared capacity is used for the denominator in the calculation of the percentage of cleared capacity which was replaced.

<sup>51</sup> A specific type of replacement activity was possible for DR resources during the period that ILR was a product. For details, see “Analysis of Replacement Capacity for RPM Commitments: June 1, 2007 to June 1 2011,” pp. 8-11, (December 11, 2012). <[http://www.monitoringanalytics.com/reports/Reports/2012/IMM\\_Report\\_Replacement\\_Capacity\\_Activity\\_20121211.pdf](http://www.monitoringanalytics.com/reports/Reports/2012/IMM_Report_Replacement_Capacity_Activity_20121211.pdf)>.

internal generation resources not in service, and external generation resources also showed the greatest variability, with a net addition of RPM commitments for some delivery years.<sup>52</sup>

Table 10 shows the ratio of total replacement capacity to total cleared capacity for each of the identified resource classifications. The gross replacement capacity values for DR used to determine the percent values in Table 10 include transactions that shift RPM commitments from a demand resource in a zone with a shortage of registered sites to a demand resource in a zone with an excess of registered sites and also include transactions that shift RPM commitments from a demand resource of one program type with a shortage of registered sites to a demand resource of another program type with an excess of registered sites.<sup>53</sup> The share of total replacement capacity for DR and EE resources to cleared capacity was the highest of the categories for every year from 2008/2009 through 2019/2020. The next highest share of total replacement capacity was for external generation resources. The ratio of total replacement capacity to cleared capacity for internal generation resources not in service also showed substantial variability.

The share of DR total replacement activity declined after the termination of the ILR product, from 63.7 percent for June 1, 2011 to 44.2 percent for June 1, 2012 but then increased to 71.8 percent for June 1, 2013.

In Table 10, the calculated shares of total replacements to cleared capacity for DR on June 1, 2012, 2013, and 2014 reflect replacement capacity for non-viable MW under the revised Reporting and Compliance provisions of the Emergency Load Response Program.<sup>54</sup> Non-viable MW are cleared MW for DR in RPM auctions held under the former Reporting and Compliance rules and which were determined to be ineligible as capacity under the revised rules governing measurement and verification.<sup>55</sup> After accounting for the non-viable MW based on DR Capacity Transition Credit nominations provided to PJM, the share of total replacement capacity for DR would have been 33.5 percent for June 1, 2012, 61.8 percent for June 1, 2013, and 48.9 percent for June 1, 2014.

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<sup>52</sup> A net addition of RPM commitments means that, on a net basis, the resources in the identified resource classification were the replacement resources for other resources and added RPM commitments.

<sup>53</sup> Prior to the 2016/2017 delivery year, the DR replacement capacity transactions included transactions that shifted RPM commitments from a planned resource to an existing resource based on revised registered sites.

<sup>54</sup> For the Demand Response Transition Provision, see OATT Attachment DD § 5.14A.

<sup>55</sup> See 138 FERC ¶ 61,138 at PP 42–44 (2011); 137 FERC ¶ 61,108 at P 81 (2011). This was the double counting order.



**Table 9 Net replacements to cleared capacity by resource classifications: June 1, 2007 to June 1, 2019**

	All Capacity Resources	Generation	Internal Generation	Internal Generation in Service	Internal Generation Not in Service	External Generation	Demand Resources	Energy Efficiency Resources
01-Jun-07	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	
01-Jun-08	(0.6%)	(0.6%)	(0.6%)	(0.6%)	(7.7%)	(0.7%)	(7.2%)	
01-Jun-09	(1.5%)	(1.2%)	(1.4%)	(1.6%)	41.8%	13.6%	(53.2%)	
01-Jun-10	(3.1%)	(2.8%)	(2.6%)	(2.6%)	(6.1%)	(10.2%)	(53.6%)	
01-Jun-11	(5.0%)	(4.3%)	(4.3%)	(3.8%)	(29.0%)	(0.8%)	(57.6%)	0.3%
01-Jun-12	(6.7%)	(5.4%)	(5.4%)	(5.5%)	2.2%	(8.1%)	(25.8%)	(5.2%)
01-Jun-13	(7.7%)	(6.1%)	(5.9%)	(5.7%)	(11.9%)	(19.7%)	(30.7%)	13.3%
01-Jun-14	(8.4%)	(4.9%)	(4.4%)	(4.6%)	0.8%	(22.1%)	(45.0%)	19.0%
01-Jun-15	(6.8%)	(4.7%)	(5.0%)	(4.6%)	(15.8%)	3.0%	(31.3%)	28.2%
01-Jun-16	(9.0%)	(6.9%)	(5.4%)	(4.2%)	(25.7%)	(37.9%)	(36.2%)	3.5%
01-Jun-17	(7.7%)	(6.2%)	(6.2%)	(4.0%)	(30.7%)	(5.3%)	(32.6%)	10.2%
01-Jun-18	(6.9%)	(5.6%)	(5.3%)	(3.1%)	(26.5%)	(17.0%)	(27.8%)	10.8%
01-Jun-19	(6.9%)	(6.2%)	(6.0%)	(6.2%)	(4.4%)	(15.8%)	(20.0%)	(2.0%)

**Table 10 Total replacements to cleared capacity by resource classification: June 1, 2007 to June 1, 2019**

	All Capacity Resources	Generation	Internal Generation	Internal Generation in Service	Internal Generation Not in Service	External Generation	Demand Resources	Energy Efficiency Resources
01-Jun-07	(0.1%)	(0.1%)	(0.1%)	(0.1%)	0.0%	0.0%	0.0%	
01-Jun-08	(2.0%)	(2.0%)	(2.0%)	(2.0%)	(7.7%)	(1.3%)	(9.8%)	
01-Jun-09	(4.0%)	(3.7%)	(3.6%)	(3.5%)	(4.8%)	(12.5%)	(56.6%)	
01-Jun-10	(5.3%)	(5.0%)	(4.8%)	(4.8%)	(6.2%)	(12.1%)	(55.6%)	
01-Jun-11	(8.1%)	(7.3%)	(7.2%)	(6.8%)	(29.4%)	(13.1%)	(63.7%)	(1.0%)
01-Jun-12	(12.5%)	(10.4%)	(10.3%)	(10.4%)	(3.4%)	(19.2%)	(44.2%)	(25.2%)
01-Jun-13	(13.4%)	(8.8%)	(8.6%)	(8.5%)	(12.5%)	(21.4%)	(71.8%)	(70.4%)
01-Jun-14	(13.6%)	(8.2%)	(7.5%)	(7.5%)	(7.2%)	(36.8%)	(62.3%)	(64.9%)
01-Jun-15	(10.7%)	(6.9%)	(6.9%)	(6.5%)	(17.4%)	(6.8%)	(47.0%)	(39.5%)
01-Jun-16	(14.8%)	(10.9%)	(8.9%)	(7.8%)	(26.1%)	(52.9%)	(54.4%)	(77.8%)
01-Jun-17	(12.5%)	(9.9%)	(9.4%)	(7.2%)	(34.0%)	(24.8%)	(45.4%)	(37.6%)
01-Jun-18	(14.3%)	(12.3%)	(11.9%)	(9.6%)	(33.8%)	(25.0%)	(36.8%)	(45.1%)
01-Jun-19	(12.4%)	(10.5%)	(10.4%)	(10.6%)	(8.1%)	(16.4%)	(35.2%)	(41.9%)

## Sources of Replacement Capacity

Table 11 through Table 18 show for each identified resource classification:

- Replacement capacity from the following sources:
  - Cleared Buy Bids. Replacement capacity purchased in an RPM incremental auction. The completion of the replacement process using cleared buy bids from RPM incremental auctions includes two transactions. The first step is for the entity to submit and clear a buy bid in an RPM incremental auction. The next step is for the entity to complete a separate replacement transaction using the cleared buy bid capacity.

- Replacement Transactions. Available capacity from a generation resource, demand resource, and/or energy efficiency resource within a provider's portfolio.<sup>56</sup>
- Locational UCAP Transactions. Available capacity from another capacity market seller's generation resource, demand resource, and/or energy efficiency resource. The completion of the replacement process using locational UCAP includes two separate transactions. The first step is the locational UCAP transaction between the buyer and seller where the seller specifies a replacement resource. At this step, the RPM commitment of the replacement resource is increased by the locational UCAP MW quantity. The next step is for the buyer to use the LDA and product type specific locational UCAP MW in a separate replacement transaction. Since the locational UCAP capacity is generalized at the LDA product type level for use in a replacement transaction, there is no direct link in the data between the resources replacing and replacement resources in this process. In addition, the buyer could transact locational UCAP from multiple sellers, and the buyer could use the locational UCAP as replacement capacity for multiple resources. To assign replacement resource types to the Locational UCAP based replacement capacity transactions in this analysis, the resource type share of the LDA and product type specific Locational UCAP MW being sold was applied to the buyer's resource(s) using the Locational UCAP based replacement capacity at the same LDA and product type.
- Excess Commitment Credits. Replacement capacity from excess commitment Credits.
- Excess ILR MW Credits. Replacement capacity from excess ILR MW Credits.
- Commitment Reductions using Replacements. RPM commitment reductions using replacement capacity; or the sum of the Cleared Buy Bids, Replacement Transactions (Gen, DR, EE), Locational UCAP Transactions (Gen, DR, EE), excess Commitment Credits, and excess ILR MW Credits columns.
- Commitment Additions on Replacement Resources. RPM commitment additions for resources that were the replacement resources for other resources.
- Net Replacements – RPM commitment reductions using replacement capacity less RPM commitment additions on the replacement resources.

The Commitment Reductions using Replacements results are the gross replacement values, or the total RPM commitments for the identified resource classification that were replaced. The reported gross replacement capacity values for DR in Table 17 include

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<sup>56</sup> The completion of the replacement process using available capacity within a provider's portfolio could be preceded by a unit specific bilateral transaction where available capacity from a capacity resource is transferred from seller to buyer. These series of transactions were not analyzed in this report.

transactions that shift RPM commitments from a demand resource in a zone with a shortage of registered sites to a demand resource in a zone with an excess of registered sites and also include transactions that shift RPM commitments from a demand resource of one program type with a shortage of registered sites to a demand resource of another program type with an excess of registered sites.<sup>57</sup> The Commitment additions on replacement resources are resources from the identified resource classification that were used as replacement capacity either for the same resource classification or another resource classification. The net replacements are the net amounts of the identified resource classification which were replaced, after accounting for the fact that some in the same identified resource classification were used as replacement capacity. The gross replacement value is the best measure of the total amount of capacity for an identified resource classification that was replaced in a year. The net replacement value is a measure of the extent to which an overall resource classification was replaced.

**Table 11 Sources of replacement capacity for all capacity resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions			Locational UCAP Transactions			UCAP (MW)					
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE	Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	Net Replacements
01-Jun-07	0.0	118.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.5	118.5	0.0
01-Jun-08	766.5	1,819.4	15.0	0.0	0.0	0.0	0.0	0.0	0.0	2,600.9	1,834.4	766.5
01-Jun-09	1,708.6	3,253.1	31.1	0.0	35.8	0.0	0.0	0.0	359.7	5,388.3	3,320.1	2,068.2
01-Jun-10	1,816.4	2,595.5	19.4	0.0	335.7	0.0	0.0	959.9	1,403.5	7,130.4	2,951.4	4,179.0
01-Jun-11	1,805.2	3,467.1	98.3	1.0	538.1	12.7	0.0	2,735.2	2,177.2	10,834.8	4,117.2	6,717.6
01-Jun-12	9,185.9	4,650.0	1,597.5	133.0	1,937.6	13.2	0.0	213.4	0.0	17,730.6	8,330.0	9,400.6
01-Jun-13	12,021.2	3,214.3	4,403.9	708.2	798.6	26.3	48.9	214.2	0.0	21,435.6	9,200.3	12,235.3
01-Jun-14	13,619.7	2,935.2	2,527.2	791.5	1,878.2	45.8	112.3	0.0	0.0	21,909.9	8,294.0	13,615.9
01-Jun-15	11,850.0	2,736.2	2,237.6	651.3	750.5	201.5	153.9	0.0	0.0	18,581.0	6,731.6	11,849.4
01-Jun-16	16,142.1	4,311.0	2,116.8	1,318.6	2,245.9	297.5	51.6	101.8	0.0	26,585.3	10,427.8	16,157.5
01-Jun-17	11,873.3	5,221.2	1,339.8	733.6	972.6	180.9	147.6	2,153.0	0.0	22,622.0	8,639.3	13,982.7
01-Jun-18	10,819.6	5,682.6	835.8	527.0	5,158.5	190.1	741.7	1,267.8	0.0	25,223.1	13,165.3	12,057.8
01-Jun-19	11,748.0	3,154.0	941.7	1,008.3	3,881.2	684.4	0.0	563.0	0.0	21,980.6	9,680.3	12,300.3

<sup>57</sup> Prior to 2016/2017, the DR replacement capacity transactions included transactions that shifted RPM commitments from a planned resource to an existing resource based on revised registered sites.

**Table 12 Sources of replacement capacity for generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												
	Replacement Transactions				Locational UCAP Transactions				Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	Net Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE						
01-Jun-07	0.0	118.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.5	118.5	0.0	
01-Jun-08	726.5	1,819.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,545.9	1,819.4	726.5	
01-Jun-09	1,322.6	3,201.4	0.0	0.0	0.0	0.0	0.0	0.0	358.5	4,882.5	3,289.0	1,593.5	
01-Jun-10	1,384.8	2,595.5	0.0	0.0	285.7	0.0	0.0	955.8	1,372.9	6,594.7	2,932.0	3,662.7	
01-Jun-11	1,192.6	3,437.1	0.0	0.0	538.1	0.0	0.0	2,601.9	1,900.9	9,670.6	4,005.2	5,665.4	
01-Jun-12	6,976.2	4,647.6	52.6	0.0	1,862.6	0.0	0.0	159.4	0.0	13,698.4	6,586.3	7,112.1	
01-Jun-13	8,772.2	3,212.2	167.2	0.0	718.6	0.0	0.0	184.2	0.0	13,054.4	4,012.9	9,041.5	
01-Jun-14	7,624.2	2,933.6	0.0	0.8	1,339.8	7.4	0.0	0.0	0.0	11,905.8	4,817.0	7,088.8	
01-Jun-15	7,305.3	2,729.7	1.5	9.0	640.4	122.1	34.7	0.0	0.0	10,842.7	3,487.1	7,355.6	
01-Jun-16	11,472.5	4,306.8	0.0	23.2	2,022.2	128.1	0.0	76.7	0.0	18,029.5	6,611.6	11,417.9	
01-Jun-17	8,822.8	5,169.1	0.0	0.0	860.5	35.0	116.0	1,504.9	0.0	16,508.3	6,200.8	10,307.5	
01-Jun-18	7,963.9	5,682.6	0.0	0.4	5,062.5	0.0	27.3	1,241.7	0.0	19,978.4	10,854.2	9,124.2	
01-Jun-19	10,020.4	3,154.0	0.0	0.0	3,637.4	0.0	0.0	345.6	0.0	17,157.4	7,045.9	10,111.5	

**Table 13 Sources of replacement capacity for internal generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												
	Replacement Transactions				Locational UCAP Transactions				Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	Net Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE						
01-Jun-07	0.0	118.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.5	118.5	0.0	
01-Jun-08	726.5	1,797.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,524.1	1,808.4	715.7	
01-Jun-09	1,319.8	3,077.4	0.0	0.0	0.0	0.0	0.0	0.0	270.1	4,667.3	2,839.5	1,827.8	
01-Jun-10	1,380.0	2,497.6	0.0	0.0	285.7	0.0	0.0	848.2	1,325.9	6,337.4	2,891.7	3,445.7	
01-Jun-11	1,192.1	3,436.4	0.0	0.0	538.1	0.0	0.0	2,433.4	1,832.4	9,432.4	3,781.4	5,651.0	
01-Jun-12	6,758.7	4,609.3	52.6	0.0	1,827.6	0.0	0.0	159.4	0.0	13,407.6	6,418.8	6,988.8	
01-Jun-13	8,294.8	3,173.7	162.3	0.0	718.6	0.0	0.0	184.2	0.0	12,533.6	3,971.3	8,562.3	
01-Jun-14	6,327.5	2,877.8	0.0	0.8	1,339.8	7.4	0.0	0.0	0.0	10,553.3	4,276.1	6,277.2	
01-Jun-15	7,023.5	2,647.5	1.5	7.8	639.5	122.1	34.7	0.0	0.0	10,476.6	2,961.1	7,515.5	
01-Jun-16	9,276.1	3,915.9	0.0	0.0	532.7	128.1	0.0	74.9	0.0	13,927.7	5,448.2	8,479.5	
01-Jun-17	8,594.3	4,172.2	0.0	0.0	850.8	35.0	115.0	1,504.8	0.0	15,272.1	5,228.9	10,043.2	
01-Jun-18	7,283.9	5,553.9	0.0	0.4	4,676.3	0.0	27.3	1,241.2	0.0	18,783.0	10,472.0	8,311.0	
01-Jun-19	9,793.7	3,142.3	0.0	0.0	3,413.6	0.0	0.0	345.6	0.0	16,695.2	7,029.7	9,665.5	

**Table 14 Sources of replacement capacity for internal generation resource in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)												
	Replacement Transactions				Locational UCAP Transactions				Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	Net Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE						
01-Jun-07	0.0	118.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.5	118.5	0.0	
01-Jun-08	718.1	1,797.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,515.6	1,808.4	707.2	
01-Jun-09	1,312.9	3,065.5	0.0	0.0	0.0	0.0	0.0	0.0	265.6	4,644.0	2,613.7	2,030.3	
01-Jun-10	1,356.6	2,477.9	0.0	0.0	285.7	0.0	0.0	848.2	1,325.8	6,294.2	2,891.1	3,403.1	
01-Jun-11	1,180.6	3,409.5	0.0	0.0	238.1	0.0	0.0	2,021.1	1,791.5	8,640.8	3,769.7	4,871.1	
01-Jun-12	6,708.2	4,557.1	52.6	0.0	1,827.6	0.0	0.0	159.4	0.0	13,304.9	6,249.0	7,055.9	
01-Jun-13	7,828.2	3,139.7	162.3	0.0	718.6	0.0	0.0	180.9	0.0	12,029.7	3,946.9	8,082.8	
01-Jun-14	6,097.9	2,873.2	0.0	0.8	1,336.6	7.4	0.0	0.0	0.0	10,315.9	4,011.8	6,304.1	
01-Jun-15	6,127.7	2,600.7	1.5	7.8	639.5	121.8	34.7	0.0	0.0	9,533.7	2,876.9	6,656.8	
01-Jun-16	7,111.4	3,701.5	0.0	0.0	532.7	128.1	0.0	74.9	0.0	11,548.6	5,410.7	6,137.9	
01-Jun-17	5,898.7	3,419.8	0.0	0.0	820.2	35.0	115.0	368.8	0.0	10,657.5	4,776.2	5,881.3	
01-Jun-18	6,532.8	3,740.5	0.0	0.4	2,891.4	0.0	27.3	542.4	0.0	13,734.8	9,380.5	4,354.3	
01-Jun-19	8,544.1	3,120.1	0.0	0.0	3,400.6	0.0	0.0	345.6	0.0	15,410.4	6,438.3	8,972.1	

**Table 15 Sources of replacement capacity for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Net Replacements
	Replacement Transactions				Locational UCAP Transactions				Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE						
01-Jun-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	8.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.5	0.0	0.0	8.5
01-Jun-09	6.9	11.9	0.0	0.0	0.0	0.0	0.0	0.0	4.5	23.3	225.8	(202.5)	(202.5)
01-Jun-10	23.4	19.7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	43.2	0.6	0.6	42.6
01-Jun-11	11.5	26.9	0.0	0.0	300.0	0.0	0.0	412.3	40.9	791.6	11.7	11.7	779.9
01-Jun-12	50.5	52.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	102.7	169.8	(67.1)	(67.1)
01-Jun-13	466.6	34.0	0.0	0.0	0.0	0.0	0.0	3.3	0.0	503.9	24.4	24.4	479.5
01-Jun-14	229.6	4.6	0.0	0.0	3.2	0.0	0.0	0.0	0.0	237.4	264.3	(26.9)	(26.9)
01-Jun-15	895.8	46.8	0.0	0.0	0.0	0.3	0.0	0.0	0.0	942.9	84.2	84.2	858.7
01-Jun-16	2,164.7	214.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2,379.1	37.5	37.5	2,341.6
01-Jun-17	2,695.6	752.4	0.0	0.0	30.6	0.0	0.0	1,136.0	0.0	4,614.6	452.7	452.7	4,161.9
01-Jun-18	751.1	1,813.4	0.0	0.0	1,784.9	0.0	0.0	698.8	0.0	5,048.2	1,091.5	1,091.5	3,956.7
01-Jun-19	1,249.6	22.2	0.0	0.0	13.0	0.0	0.0	0.0	0.0	1,284.8	591.4	591.4	693.4

**Table 16 Sources of replacement capacity for external generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Net Replacements
	Replacement Transactions				Locational UCAP Transactions				Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE						
01-Jun-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	0.0	21.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	21.8	11.0	11.0	10.8
01-Jun-09	2.8	124.0	0.0	0.0	0.0	0.0	0.0	0.0	88.4	215.2	449.5	(234.3)	(234.3)
01-Jun-10	4.8	97.9	0.0	0.0	0.0	0.0	0.0	107.6	47.0	257.3	40.3	40.3	217.0
01-Jun-11	0.5	0.7	0.0	0.0	0.0	0.0	0.0	168.5	68.5	238.2	223.8	(14.4)	(14.4)
01-Jun-12	217.5	38.3	0.0	0.0	35.0	0.0	0.0	0.0	0.0	290.8	167.5	167.5	123.3
01-Jun-13	477.4	38.5	4.9	0.0	0.0	0.0	0.0	0.0	0.0	520.8	41.6	41.6	479.2
01-Jun-14	1,296.7	55.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1,352.5	540.9	540.9	811.6
01-Jun-15	281.8	82.2	0.0	1.2	0.9	0.0	0.0	0.0	0.0	366.1	526.0	(159.9)	(159.9)
01-Jun-16	2,196.4	390.9	0.0	23.2	1,489.5	0.0	0.0	1.8	0.0	4,101.8	1,163.4	1,163.4	2,938.4
01-Jun-17	228.5	996.9	0.0	0.0	9.7	0.0	1.0	0.1	0.0	1,236.2	971.9	971.9	264.3
01-Jun-18	680.0	128.7	0.0	0.0	386.2	0.0	0.0	0.5	0.0	1,195.4	382.2	382.2	813.2
01-Jun-19	226.7	11.7	0.0	0.0	223.8	0.0	0.0	0.0	0.0	462.2	16.2	16.2	446.0

**Table 17 Sources of replacement capacity for demand resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Net Replacements
	Replacement Transactions				Locational UCAP Transactions				Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE						
01-Jun-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	40.0	0.0	15.0	0.0	0.0	0.0	0.0	0.0	0.0	55.0	15.0	15.0	40.0
01-Jun-09	386.0	51.7	31.1	0.0	35.8	0.0	0.0	0.0	1.2	505.8	31.1	31.1	474.7
01-Jun-10	431.6	0.0	19.4	0.0	50.0	0.0	0.0	4.1	30.6	535.7	19.4	19.4	516.3
01-Jun-11	612.6	30.0	98.3	0.2	0.0	12.7	0.0	133.3	276.3	1,163.4	111.0	111.0	1,052.4
01-Jun-12	2,169.6	2.4	1,544.7	12.7	67.7	13.2	0.0	54.0	0.0	3,864.3	1,610.7	1,610.7	2,253.6
01-Jun-13	3,212.3	2.1	4,208.6	144.6	80.0	25.1	46.3	25.6	0.0	7,744.6	4,430.2	4,430.2	3,314.4
01-Jun-14	5,952.0	1.6	2,526.5	187.7	498.2	38.4	100.4	0.0	0.0	9,304.8	2,573.0	2,573.0	6,731.8
01-Jun-15	4,544.7	6.5	2,236.1	174.7	110.0	79.4	117.6	0.0	0.0	7,269.0	2,439.3	2,439.3	4,829.7
01-Jun-16	4,542.1	4.2	2,115.6	97.3	223.4	169.4	38.9	25.1	0.0	7,216.0	2,415.3	2,415.3	4,800.7
01-Jun-17	2,944.3	52.1	1,339.0	134.4	112.1	145.9	20.0	643.7	0.0	5,391.5	1,520.7	1,520.7	3,870.8
01-Jun-18	2,854.5	0.0	834.9	223.7	96.0	190.1	0.0	9.4	0.0	4,208.6	1,026.2	1,026.2	3,182.4
01-Jun-19	1,722.4	0.0	941.7	0.0	243.8	684.3	0.0	172.7	0.0	3,764.9	1,626.1	1,626.1	2,138.8

**Table 18 Sources of replacement capacity for energy efficiency resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				UCAP (MW)			Excess Commitment Credits	Excess ILR MW Credits	Commitment Reductions using Replacements	Commitment Additions on Replacement Resources	Net Replacements
	Cleared Buy Bids	Gen	DR	EE	Locational UCAP Transactions							
					Gen	DR	EE					
01-Jun-07	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-09	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-11	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.8	1.0	(0.2)
01-Jun-12	40.1	0.0	0.2	120.3	7.3	0.0	0.0	0.0	0.0	167.9	133.0	34.9
01-Jun-13	36.7	0.0	28.1	563.6	0.0	1.2	2.6	4.4	0.0	636.6	757.2	(120.6)
01-Jun-14	43.5	0.0	0.7	603.0	40.2	0.0	11.9	0.0	0.0	699.3	904.0	(204.7)
01-Jun-15	0.0	0.0	0.0	467.6	0.1	0.0	1.6	0.0	0.0	469.3	805.2	(335.9)
01-Jun-16	127.5	0.0	1.2	1,198.1	0.3	0.0	12.7	0.0	0.0	1,339.8	1,400.9	(61.1)
01-Jun-17	106.2	0.0	0.8	599.2	0.0	0.0	11.6	4.4	0.0	722.2	917.8	(195.6)
01-Jun-18	1.2	0.0	0.9	302.9	0.0	0.0	714.4	16.7	0.0	1,036.1	1,284.9	(248.8)
01-Jun-19	5.2	0.0	0.0	1,008.3	0.0	0.1	0.0	44.7	0.0	1,058.3	1,008.3	50.0

Table 19 shows the calculation of the adjusted cleared MW quantities for Base Residual Auctions (BRAs) for all Capacity Resources:

- Cleared BRA. The original cleared sell offers and make whole MW in the RPM Base Residual Auction (BRA) for the given delivery year.
- BRA Adjustments to Cleared. Changes to cleared MW quantities in the BRA after the auction results were posted due to Relief from Charges or various transition provisions.
- BRA CP Adjustments to Cleared. BRA commitments converted to Capacity Performance (CP) commitments as a result of the CP transition incremental auctions, which were held for the 2016/2017 and 2017/2018 delivery years.
- Adjusted Cleared BRA. The final BRA cleared MW quantity after accounting for adjustments and the CP Transition IA results.

Table 20 shows the net change in RPM commitments from the BRA to the start of the delivery year for all Capacity Resources:

- Adjusted Cleared BRA. From Table 19.
- Cleared CP Transition IAs. Cleared capacity, including converted and new commitments, in the CP transition incremental auctions, which were held for the 2016/2017 and 2017/2018 delivery years.
- Cleared Offers IAs
  - Resource Swap. Cleared participant sell offers with an equal quantity of cleared participant buy bids in IAs.
  - Net PJM Procurement. For the 2012/2013 and subsequent delivery years, cleared participant sell offers as a result of a net PJM procurement in IAs (cleared PJM buy bids exceeded cleared PJM sell offers).
  - Make whole IAs. Make whole MW quantities in IAs.
  - IAs Adjustments to Cleared. Changes to cleared MW quantities in the BRA due to Relief from Charges or various transition provisions.

- IAs CP Adjustments to Cleared. IA commitments converted to CP commitments as a result of the CP transition incremental auctions, which were held for the 2016/2017 and 2017/2018 delivery years.
- Cleared Buy Bids IAs
  - Resource Swap. Cleared participant buy bids with an equal quantity of cleared participant sell offers in IAs.
  - Net PJM Release. For the 2012/2013 and subsequent delivery years, cleared participant buy bids as a result of a net PJM release in IAs (cleared PJM sell offers exceeded cleared PJM buy bids).
  - Unutilized Cleared Buy Bids. Cleared buy bids in IAs that were not used in replacement capacity transactions.
- Non-Cleared Buy Bids Based Replacements
  - Replacement Commitment Reductions. RPM commitment reductions using replacement capacity from replacement resources within a provider's portfolio; or the sum of Replacement Transactions (Gen, DR, EE) in Table 11.
  - Replacement Commitment Additions. RPM commitment additions on resources that were the replacement resources for resources within a provider's portfolio.
  - Locational UCAP Commitment Reductions. RPM commitment reductions using replacement capacity outside a provider's portfolio; or the sum of Locational UCAP Transactions (Gen, DR, EE) in Table 11.
  - Locational UCAP Commitment Additions. RPM commitment additions on resources that were the replacement resources for resources outside a provider's portfolio.
  - Unutilized Locational UCAP. Under (or over) utilization of replacement capacity associated with Locational UCAP transactions.
  - Excess Commitment Credits. Replacement capacity from excess Commitment Credits.
  - Excess ILR MW Credits. Replacement capacity from Excess ILR MW Credits.
- Net Change. Net change in RPM commitment level from the BRA; or the sum of all columns from Cleared CP Transition IAs through Excess ILR MW Credits.
- RPM Commitments. Adjusted Cleared BRA plus Net Change; or RPM cleared capacity in all auctions for delivery year plus net replacements in Table 1.

The sum of the columns under the Cleared Buy Bids IAs header and the Non-Cleared Buy Bid Based Replacements header in Table 20 equals the net replacements, also shown in Table 1. Table 20 illustrates that some replacement transactions result in swapping of RPM commitments and some result in a net change in RPM commitments. For example, Table 20 shows that the Replacement Commitment Reductions column and the Replacement Commitment Additions column net to zero and that the Locational UCAP Commitment Reductions column and the Locational UCAP Commitment Additions column net to zero. A reduction in RPM commitments from the BRA can result from cleared buy bid based replacement capacity as a result of cleared PJM sell offers,

replacement capacity from excess commitment credits, and replacement capacity from excess ILR MW Credits. An addition in RPM commitments from the BRA can result from cleared sell offers in IAs as a result of cleared PJM buy bids, unutilized cleared buy bids, and unutilized locational UCAP.<sup>58</sup>

Table 21 shows the participant cleared buy bids for all RPM incremental auctions held to date. Based on the historical average cleared buy bid utilization rate of 93.9 percent, the cleared buy bid MW quantity used as replacement capacity for June 1, 2020, would be 5,906.3 MW. This result assumes the behavior remains consistent, and it does not consider the results of the 2020/2021 RPM Third Incremental Auction which will be held in February 2020.

**Table 19 RPM Base Residual Auction cleared MW adjustments: June 1, 2007 to June 1, 2019**

	Cleared BRA	UCAP (MW)		Adjusted Cleared BRA
		BRA Adjustments to Cleared	BRA CP Adjustments to Cleared	
01-Jun-07	129,409.2	0.0	0.0	129,409.2
01-Jun-08	129,597.6	0.0	0.0	129,597.6
01-Jun-09	132,231.8	0.0	0.0	132,231.8
01-Jun-10	132,190.4	0.0	0.0	132,190.4
01-Jun-11	132,264.5	0.0	0.0	132,264.5
01-Jun-12	136,365.6	(11.7)	0.0	136,353.9
01-Jun-13	152,757.3	0.0	0.0	152,757.3
01-Jun-14	150,087.3	(9.4)	0.0	150,077.9
01-Jun-15	164,563.9	(325.9)	0.0	164,238.0
01-Jun-16	169,159.7	(23.8)	(88,786.4)	80,349.5
01-Jun-17	167,068.9	0.0	(102,177.5)	64,891.4
01-Jun-18	166,875.5	0.0	0.0	166,875.5
01-Jun-19	167,329.5	0.0	0.0	167,329.5

<sup>58</sup> The Net PJM Procurement or Net PJM Release columns account for EE add back mechanism related adjustments, which were implemented in RPM auctions held after December 17, 2015.



**Table 20 RPM commitment changes from Base Residual Auction to start of delivery year: June 1, 2007 to June 1, 2019**

	UCAP (MW)																	Net Change	RPM Commitments		
	Cleared Offers IAs							Cleared Buy Bids IAs				Non-Cleared Buy Bid Based Replacements									
	Adjusted Cleared BRA	Cleared CP Transition IAs	Resource Swap	Net PJM Procurement	Make Whole IAs	Adjustments to Cleared	IAs CP Adjustments to Cleared	Resource Swap	Net PJM Release	Unutilized Cleared Buy Bids	Replacement Commitment Reductions	Replacement Commitment Additions	Local UCAP Commitment Reductions	Local UCAP Commitment Additions	Unutilized Local UCAP	Excess Commitment	Excess ILR MW Credits				
01-Jun-07	129,409.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	129,409.2	
01-Jun-08	129,597.6	0.0	1,032.2	0.0	0.0	0.0	(1,032.2)	0.0	265.7	(1,834.4)	1,834.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	265.7	129,863.3
01-Jun-09	132,231.8	0.0	1,798.4	0.0	0.0	0.0	(1,798.4)	0.0	89.8	(3,284.2)	3,284.2	(35.8)	35.8	0.1	0.0	(359.7)	(269.8)	0.0	0.0	(359.7)	131,962.0
01-Jun-10	132,190.4	0.0	1,845.8	0.0	0.0	0.0	(1,845.8)	0.0	29.4	(2,614.9)	2,614.9	(335.7)	335.7	0.8	(959.9)	(1,403.5)	(2,333.2)	0.0	0.0	(959.9)	129,857.2
01-Jun-11	132,264.5	0.0	1,918.1	0.0	0.0	0.0	(1,918.1)	0.0	112.9	(3,566.4)	3,566.4	(550.8)	550.8	0.0	(2,735.2)	(2,177.2)	(4,799.5)	0.0	0.0	(2,735.2)	127,465.0
01-Jun-12	136,353.9	0.0	4,930.0	0.0	0.0	0.0	(4,930.0)	(4,416.4)	160.5	(6,380.5)	6,380.5	(1,950.8)	1,950.8	(1.3)	(213.4)	0.0	(4,470.6)	0.0	0.0	(213.4)	131,883.3
01-Jun-13	152,757.3	0.0	7,087.2	0.0	0.0	0.0	(7,087.2)	(6,562.0)	1,628.0	(8,326.4)	8,326.4	(873.8)	873.8	0.1	(214.2)	0.0	(5,148.1)	0.0	0.0	(214.2)	147,609.2
01-Jun-14	150,077.9	0.0	11,127.1	0.0	0.0	0.0	(11,127.1)	(2,881.4)	368.8	(6,253.9)	6,253.9	(2,036.3)	2,036.3	3.8	0.0	0.0	(2,488.8)	0.0	0.0	0.0	147,589.1
01-Jun-15	164,238.0	0.0	9,252.3	0.0	29.3	(2,094.4)	(9,252.3)	(2,727.1)	129.4	(5,625.1)	5,625.1	(1,105.9)	1,105.9	0.6	0.0	0.0	(2,568.0)	0.0	0.0	0.0	161,670.0
01-Jun-16	80,349.5	95,096.6	6,368.1	0.0	0.0	(0.8)	(6,368.1)	(10,268.7)	494.7	(7,746.4)	7,746.4	(2,595.0)	2,595.0	86.4	(101.8)	0.0	83,242.0	0.0	0.0	(101.8)	163,591.5
01-Jun-17	64,891.4	112,194.5	3,504.6	0.0	0.0	0.0	(3,504.6)	(8,909.7)	541.0	(7,294.6)	7,294.6	(1,301.1)	1,301.1	43.6	(2,153.0)	0.0	101,716.4	0.0	0.0	(2,153.0)	166,607.8
01-Jun-18	166,875.5	0.0	9,120.5	0.0	0.0	0.0	(9,120.5)	(2,332.7)	633.6	(7,045.4)	7,045.4	(6,090.3)	6,090.3	29.6	(1,267.8)	0.0	(2,937.3)	0.0	0.0	(1,267.8)	163,938.2
01-Jun-19	167,329.5	0.0	9,734.7	0.0	0.0	0.0	(9,734.7)	(2,513.1)	498.8	(5,104.0)	5,104.0	(4,565.6)	4,565.6	10.7	(563.0)	0.0	(2,565.6)	0.0	0.0	(563.0)	164,763.9

**Table 21 Participant cleared buy bids in RPM incremental auctions: 2007/2008 through 2020/2021**

	UCAP (MW)			
	First IA	Second IA	Third IA	Total
2007/2008				0.0
2008/2009			1,032.2	1,032.2
2009/2010			1,798.4	1,798.4
2010/2011			1,845.8	1,845.8
2011/2012	361.1		1,557.0	1,918.1
2012/2013	1,749.0	3,214.6	4,382.8	9,346.4
2013/2014	4,882.0	5,598.8	3,168.4	13,649.2
2014/2015	6,849.8	4,476.4	2,682.3	14,008.5
2015/2016	5,987.4	2,692.9	3,299.1	11,979.4
2016/2017	5,557.0	5,058.5	6,021.3	16,636.8
2017/2018	4,183.9	4,211.3	4,019.1	12,414.3
2018/2019	2,365.8	4,888.3	4,199.1	11,453.2
2019/2020	3,992.0	2,293.6	5,962.2	12,247.8
2020/2021	4,326.3	1,963.7		6,290.0

Table 22 through Table 29 show the ratio of MW associated with each of the sources of replacement capacity to total replacement capacity for the identified resource classifications along with an indication of the major source of replacement capacity. The gross replacement capacity values for DR used to determine the percentages in Table 28 include transactions that shift RPM commitments from a demand resource in a zone with a shortage of registered sites to a demand resource in a zone with an excess of registered sites and also include transactions that shift RPM commitments from a

demand resource of one program type with a shortage of registered sites to a demand resource of another program type with an excess of registered sites.<sup>59</sup>

For the period prior to June 1, 2012, the major source of replacement capacity for generation resources, internal generation resources, and internal generation resources in service was available capacity from other generation resources completed through a replacement capacity transaction from within a provider's portfolio. The sources of replacement capacity for internal generation resources not in service and external generation resources varied by delivery year, with the major sources including cleared buy bids, available capacity from other generation resources completed through a replacement capacity transaction from within a provider's portfolio, and excess commitment credits.

The major source of replacement capacity for DR was cleared buy bids for each of the days analyzed with the exception of June 1, 2013, where the major source was available capacity from other DR. In Table 17, the values reported for commitment reductions using replacements on June 1, 2012, 2013, and 2014 reflect replacement capacity for non-viable MW under the revised Reporting and Compliance provisions of the Emergency Load Response Program.<sup>60</sup> Non-viable MW are cleared MW for DR in RPM auctions held under the former Reporting and Compliance rules and which were determined to be ineligible as capacity under the revised rules governing measurement and verification. Of the 3,864.3 MW of replacement capacity for DR on June 1, 2012, 939.4 MW were associated with non-viable MW based on DR capacity transition credit nominations to PJM. Of the 7,744.6 MW of replacement capacity for DR on June 1, 2013, 1,081.7 MW were associated with non-viable MW based on DR capacity transition credit nominations to PJM. Of the 9,304.8 MW of replacement capacity for DR on June 1, 2014, 1,995.2 MW were associated with non-viable MW based on DR capacity transition credit nominations to PJM.

The major source of replacement capacity for EE resources was available capacity from other EE resources completed through a replacement capacity transaction from within a provider's portfolio.

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<sup>59</sup> Prior to 2016/2017, the DR replacement capacity transactions included transactions that shifted RPM commitments from a planned resource to an existing resource based on revised registered sites.

<sup>60</sup> For the Demand Response Transition Provision, see OATT Attachment DD § 5.14A.

**Table 22 Sources of replacement capacity to total replacements for all capacity resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-08	29.5%	70.0%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-09	31.7%	60.4%	0.6%	0.0%	0.7%	0.0%	0.0%	0.0%	6.7%	100.0%	Replacement Transactions - Gen
01-Jun-10	25.5%	36.4%	0.3%	0.0%	4.7%	0.0%	0.0%	13.5%	19.7%	100.0%	Replacement Transactions - Gen
01-Jun-11	16.7%	32.0%	0.9%	0.0%	5.0%	0.1%	0.0%	25.2%	20.1%	100.0%	Replacement Transactions - Gen
01-Jun-12	51.8%	26.2%	9.0%	0.8%	10.9%	0.1%	0.0%	1.2%	0.0%	100.0%	Cleared Buy Bids
01-Jun-13	56.1%	15.0%	20.5%	3.3%	3.7%	0.1%	0.2%	1.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-14	62.2%	13.4%	11.5%	3.6%	8.6%	0.2%	0.5%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	63.8%	14.7%	12.0%	3.5%	4.0%	1.1%	0.8%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	60.7%	16.2%	8.0%	5.0%	8.4%	1.1%	0.2%	0.4%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	52.5%	23.1%	5.9%	3.2%	4.3%	0.8%	0.7%	9.5%	0.0%	100.0%	Cleared Buy Bids
01-Jun-18	42.9%	22.5%	3.3%	2.1%	20.5%	0.8%	2.9%	5.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-19	53.4%	14.3%	4.3%	4.6%	17.7%	3.1%	0.0%	2.6%	0.0%	100.0%	Cleared Buy Bids

**Table 23 Sources of replacement capacity to total replacements for generation resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-08	28.5%	71.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-09	27.1%	65.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7.3%	100.0%	Replacement Transactions - Gen
01-Jun-10	21.0%	39.4%	0.0%	0.0%	4.3%	0.0%	0.0%	14.5%	20.8%	100.0%	Replacement Transactions - Gen
01-Jun-11	12.3%	35.5%	0.0%	0.0%	5.6%	0.0%	0.0%	26.9%	19.7%	100.0%	Replacement Transactions - Gen
01-Jun-12	50.9%	33.9%	0.4%	0.0%	13.6%	0.0%	0.0%	1.2%	0.0%	100.0%	Cleared Buy Bids
01-Jun-13	67.2%	24.6%	1.3%	0.0%	5.5%	0.0%	0.0%	1.4%	0.0%	100.0%	Cleared Buy Bids
01-Jun-14	64.0%	24.6%	0.0%	0.0%	11.3%	0.1%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	67.4%	25.2%	0.0%	0.1%	5.9%	1.1%	0.3%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	63.6%	23.9%	0.0%	0.1%	11.2%	0.7%	0.0%	0.4%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	53.4%	31.3%	0.0%	0.0%	5.2%	0.2%	0.7%	9.1%	0.0%	100.0%	Cleared Buy Bids
01-Jun-18	39.9%	28.4%	0.0%	0.0%	25.3%	0.0%	0.1%	6.2%	0.0%	100.0%	Cleared Buy Bids
01-Jun-19	58.4%	18.4%	0.0%	0.0%	21.2%	0.0%	0.0%	2.0%	0.0%	100.0%	Cleared Buy Bids

**Table 24 Sources of replacement capacity to total replacements for internal generation resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-08	28.8%	71.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-09	28.3%	65.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.8%	100.0%	Replacement Transactions - Gen
01-Jun-10	21.8%	39.4%	0.0%	0.0%	4.5%	0.0%	0.0%	13.4%	20.9%	100.0%	Replacement Transactions - Gen
01-Jun-11	12.6%	36.4%	0.0%	0.0%	5.7%	0.0%	0.0%	25.8%	19.4%	100.0%	Replacement Transactions - Gen
01-Jun-12	50.4%	34.4%	0.4%	0.0%	13.6%	0.0%	0.0%	1.2%	0.0%	100.0%	Cleared Buy Bids
01-Jun-13	66.2%	25.3%	1.3%	0.0%	5.7%	0.0%	0.0%	1.5%	0.0%	100.0%	Cleared Buy Bids
01-Jun-14	60.0%	27.3%	0.0%	0.0%	12.7%	0.1%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	67.0%	25.3%	0.0%	0.1%	6.1%	1.2%	0.3%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	66.6%	28.1%	0.0%	0.0%	3.8%	0.9%	0.0%	0.5%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	56.3%	27.3%	0.0%	0.0%	5.6%	0.2%	0.8%	9.9%	0.0%	100.0%	Cleared Buy Bids
01-Jun-18	38.8%	29.6%	0.0%	0.0%	24.9%	0.0%	0.1%	6.6%	0.0%	100.0%	Cleared Buy Bids
01-Jun-19	58.7%	18.8%	0.0%	0.0%	20.4%	0.0%	0.0%	2.1%	0.0%	100.0%	Cleared Buy Bids

**Table 25 Sources of replacement capacity to total replacements for internal generation resources in service: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-08	28.5%	71.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-09	28.3%	66.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.7%	100.0%	Replacement Transactions - Gen
01-Jun-10	21.6%	39.4%	0.0%	0.0%	4.5%	0.0%	0.0%	13.5%	21.1%	100.0%	Replacement Transactions - Gen
01-Jun-11	13.7%	39.5%	0.0%	0.0%	2.8%	0.0%	0.0%	23.4%	20.7%	100.0%	Replacement Transactions - Gen
01-Jun-12	50.4%	34.3%	0.4%	0.0%	13.7%	0.0%	0.0%	1.2%	0.0%	100.0%	Cleared Buy Bids
01-Jun-13	65.1%	26.1%	1.3%	0.0%	6.0%	0.0%	0.0%	1.5%	0.0%	100.0%	Cleared Buy Bids
01-Jun-14	59.1%	27.9%	0.0%	0.0%	13.0%	0.1%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	64.3%	27.3%	0.0%	0.1%	6.7%	1.3%	0.4%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	61.6%	32.1%	0.0%	0.0%	4.6%	1.1%	0.0%	0.6%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	55.3%	32.1%	0.0%	0.0%	7.7%	0.3%	1.1%	3.5%	0.0%	100.0%	Cleared Buy Bids
01-Jun-18	47.6%	27.2%	0.0%	0.0%	21.1%	0.0%	0.2%	3.9%	0.0%	100.0%	Cleared Buy Bids
01-Jun-19	55.4%	20.2%	0.0%	0.0%	22.1%	0.0%	0.0%	2.2%	0.0%	100.0%	Cleared Buy Bids

**Table 26 Sources of replacement capacity to total replacements for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07											
01-Jun-08	98.8%	1.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-09	29.6%	51.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19.3%	100.0%	Replacement Transactions - Gen
01-Jun-10	54.2%	45.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	100.0%	Cleared Buy Bids
01-Jun-11	1.5%	3.4%	0.0%	0.0%	37.9%	0.0%	0.0%	52.1%	5.2%	100.0%	Excess Commitment Credits
01-Jun-12	49.2%	50.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-13	92.6%	6.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	100.0%	Cleared Buy Bids
01-Jun-14	96.7%	1.9%	0.0%	0.0%	1.3%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	95.0%	5.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	91.0%	9.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	58.4%	16.3%	0.0%	0.0%	0.7%	0.0%	0.0%	24.6%	0.0%	100.0%	Cleared Buy Bids
01-Jun-18	14.9%	35.9%	0.0%	0.0%	35.4%	0.0%	0.0%	13.8%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-19	97.3%	1.7%	0.0%	0.0%	1.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids

**Table 27 Sources of replacement capacity to total replacements for external generation resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07											
01-Jun-08	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-09	1.3%	57.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	41.1%	100.0%	Replacement Transactions - Gen
01-Jun-10	1.9%	38.0%	0.0%	0.0%	0.0%	0.0%	0.0%	41.8%	18.3%	100.0%	Excess Commitment Credits
01-Jun-11	0.2%	0.3%	0.0%	0.0%	0.0%	0.0%	0.0%	70.7%	28.8%	100.0%	Excess Commitment Credits
01-Jun-12	74.8%	13.2%	0.0%	0.0%	12.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-13	91.7%	7.4%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-14	95.9%	4.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	77.0%	22.5%	0.0%	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	53.5%	9.5%	0.0%	0.6%	36.3%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	18.5%	80.6%	0.0%	0.0%	0.8%	0.0%	0.1%	0.0%	0.0%	100.0%	Replacement Transactions - Gen
01-Jun-18	56.9%	10.8%	0.0%	0.0%	32.3%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-19	49.0%	2.5%	0.0%	0.0%	48.4%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids

**Table 28 Sources of replacement capacity to total replacements for demand resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07											
01-Jun-08	72.7%	0.0%	27.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-09	76.3%	10.2%	6.1%	0.0%	7.1%	0.0%	0.0%	0.0%	0.2%	100.0%	Cleared Buy Bids
01-Jun-10	80.6%	0.0%	3.6%	0.0%	9.3%	0.0%	0.0%	0.8%	5.7%	100.0%	Cleared Buy Bids
01-Jun-11	52.7%	2.6%	8.4%	0.0%	0.0%	1.1%	0.0%	11.5%	23.7%	100.0%	Cleared Buy Bids
01-Jun-12	56.1%	0.1%	40.0%	0.3%	1.8%	0.3%	0.0%	1.4%	0.0%	100.0%	Cleared Buy Bids
01-Jun-13	41.5%	0.0%	54.3%	1.9%	1.0%	0.3%	0.6%	0.3%	0.0%	100.0%	Replacement Transactions - DR
01-Jun-14	64.0%	0.0%	27.2%	2.0%	5.4%	0.4%	1.1%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-15	62.5%	0.1%	30.8%	2.4%	1.5%	1.1%	1.6%	0.0%	0.0%	100.0%	Cleared Buy Bids
01-Jun-16	62.9%	0.1%	29.3%	1.3%	3.1%	2.3%	0.5%	0.3%	0.0%	100.0%	Cleared Buy Bids
01-Jun-17	54.6%	1.0%	24.8%	2.5%	2.1%	2.7%	0.4%	11.9%	0.0%	100.0%	Cleared Buy Bids
01-Jun-18	67.8%	0.0%	19.8%	5.3%	2.3%	4.5%	0.0%	0.2%	0.0%	100.0%	Cleared Buy Bids
01-Jun-19	45.7%	0.0%	25.0%	0.0%	6.5%	18.2%	0.0%	4.6%	0.0%	100.0%	Cleared Buy Bids

**Table 29 Sources of replacement capacity to total replacements for energy efficiency Resources: June 1, 2007 to June 1, 2019**

	Replacement Transactions				UCAP (MW) Locational UCAP Transactions			Excess Commitment Credits	Excess ILR MW Credits	Total Replacements	Major Source of Replacements
	Cleared Buy Bids	Gen	DR	EE	Gen	DR	EE				
01-Jun-07											
01-Jun-08											
01-Jun-09											
01-Jun-10											
01-Jun-11	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-12	23.9%	0.0%	0.1%	71.6%	4.3%	0.0%	0.0%	0.0%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-13	5.8%	0.0%	4.4%	88.5%	0.0%	0.2%	0.4%	0.7%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-14	6.2%	0.0%	0.1%	86.2%	5.7%	0.0%	1.7%	0.0%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-15	0.0%	0.0%	0.0%	99.6%	0.0%	0.0%	0.3%	0.0%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-16	9.5%	0.0%	0.1%	89.4%	0.0%	0.0%	0.9%	0.0%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-17	14.7%	0.0%	0.1%	83.0%	0.0%	0.0%	1.6%	0.6%	0.0%	100.0%	Replacement Transactions - EE
01-Jun-18	0.1%	0.0%	0.1%	29.2%	0.0%	0.0%	69.0%	1.6%	0.0%	100.0%	Locational UCAP Transactions - EE
01-Jun-19	0.5%	0.0%	0.0%	95.3%	0.0%	0.0%	0.0%	4.2%	0.0%	100.0%	Replacement Transactions - EE

To better understand the supply associated with cleared buy bids used as replacement capacity in Table 11, cleared buy bids used as replacement capacity were allocated based on the share of cleared generation resources, demand resources, energy efficiency resources, and PJM sell offers in RPM incremental auctions. Table 30 through Table 37 show the cleared buy bids in the specified RPM incremental auction used as replacement capacity for each of the identified resource classifications broken out by the type of cleared sell offer (Generation, DR, EE, or PJM) based on this allocation method.<sup>61</sup>

For example, Table 11 shows that the replacement capacity which came from cleared buy bids in RPM incremental auctions is 11,748.0 MW for June 1, 2019. That amount is prorated by share of cleared Generation, DR, EE and PJM sell offers in each incremental auction in Table 30. The total in Table 30, on June 1, 2019, is 11,748.0 MW.

<sup>61</sup> The rules introducing the potential inclusion of PJM sell offers or buy bids in RPM incremental auctions were effective with the 2012/2013 Delivery Year.

The Net PJM Release column in Table 20 differs from the sum of the PJM columns in Table 30 for the following reasons: the Net PJM Release column in Table 20 is net of cleared PJM buy bids, while the PJM columns in Table 30 are based on gross cleared PJM sell offers; and the allocation in Table 30 implicitly accounts for unutilized cleared buy bids while the Net PJM Release column in Table 20 explicitly accounts for unutilized cleared buy bids.

**Table 30 Cleared buy bids used as replacement capacity for all capacity resources: June 1, 2007 to June 1, 2019**

	First Incremental Auction				UCAP (MW) Second Incremental Auction				Third Incremental Auction				Total
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									749.4	17.1	0.0	0.0	766.5
01-Jun-09									1,708.6	0.0	0.0	0.0	1,708.6
01-Jun-10									1,792.9	23.5	0.0	0.0	1,816.4
01-Jun-11	346.7	0.0	0.0	0.0					954.4	432.5	71.6	0.0	1,805.2
01-Jun-12	159.1	241.8	0.0	1,285.3	597.2	218.3	16.6	2,359.6	1,289.1	988.2	78.9	1,951.8	9,185.9
01-Jun-13	1,346.1	376.6	41.4	3,060.2	892.4	491.4	98.5	2,603.0	2,230.1	302.4	31.2	547.8	12,021.2
01-Jun-14	3,874.5	130.0	126.1	2,468.5	2,598.4	171.9	64.1	1,568.1	2,096.7	300.1	31.2	190.1	13,619.7
01-Jun-15	3,905.0	86.6	86.2	1,839.4	1,584.5	157.6	5.4	896.4	2,457.0	649.8	182.1	0.0	11,850.0
01-Jun-16	3,748.5	284.7	39.4	1,462.2	664.7	59.1	15.5	4,170.6	922.8	260.4	115.6	4,398.7	16,142.1
01-Jun-17	360.1	186.5	12.2	3,572.2	1,016.9	104.1	214.0	2,737.3	1,111.0	121.2	70.4	2,367.4	11,873.3
01-Jun-18	1,661.1	68.1	419.6	144.9	1,863.2	69.8	195.1	2,500.2	2,954.0	141.0	399.2	403.4	10,819.6
01-Jun-19	1,942.2	25.5	297.5	1,623.6	705.2	78.3	230.5	938.5	4,892.9	261.8	309.0	442.9	11,748.0

**Table 31 Cleared buy bids used as replacement capacity for generation resources: June 1, 2007 to June 1, 2019**

	First Incremental Auction				UCAP (MW) Second Incremental Auction				Third Incremental Auction				Total
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									710.3	16.2	0.0	0.0	726.5
01-Jun-09									1,322.6	0.0	0.0	0.0	1,322.6
01-Jun-10									1,366.9	17.9	0.0	0.0	1,384.8
01-Jun-11	126.6	0.0	0.0	0.0					697.6	316.1	52.3	0.0	1,192.6
01-Jun-12	128.4	199.6	0.0	1,062.3	506.0	187.2	13.3	2,025.0	854.2	654.8	52.3	1,293.2	6,976.2
01-Jun-13	1,227.5	339.3	32.4	2,676.4	596.8	319.4	61.2	1,733.9	1,469.3	194.2	19.1	102.6	8,772.2
01-Jun-14	3,294.4	19.9	104.4	0.0	1,692.9	125.5	44.1	790.4	1,220.1	185.7	17.9	128.9	7,624.2
01-Jun-15	2,009.4	54.4	33.7	1,124.9	1,124.0	5.1	3.6	430.2	2,275.1	76.8	168.2	0.0	7,305.3
01-Jun-16	3,083.4	172.5	33.3	757.2	452.4	38.5	10.1	2,934.2	655.5	177.1	82.7	3,075.7	11,472.5
01-Jun-17	285.0	136.5	9.1	2,615.1	757.3	79.8	160.5	2,064.3	820.7	89.8	51.8	1,752.9	8,822.8
01-Jun-18	941.0	40.8	237.4	66.8	1,558.6	50.4	165.4	1,818.2	2,256.1	115.4	376.8	336.9	7,963.9
01-Jun-19	1,822.1	12.0	277.1	1,133.9	597.6	66.3	191.6	658.2	4,468.0	184.5	284.9	324.1	10,020.4

**Table 32 Cleared buy bids used as replacement capacity for internal generation resources: June 1, 2007 to June 1, 2019**

	First Incremental Auction				UCAP (MW) Second Incremental Auction				Third Incremental Auction				Total
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									710.3	16.2	0.0	0.0	726.5
01-Jun-09									1,319.8	0.0	0.0	0.0	1,319.8
01-Jun-10									1,362.1	17.9	0.0	0.0	1,380.0
01-Jun-11	126.6	0.0	0.0	0.0					697.3	316.0	52.3	0.0	1,192.1
01-Jun-12	124.2	193.0	0.0	1,027.4	506.0	187.2	13.3	2,025.0	802.8	615.3	49.1	1,215.4	6,758.7
01-Jun-13	1,139.5	315.0	30.2	2,500.9	595.8	318.8	61.1	1,730.7	1,308.2	175.2	17.5	102.0	8,294.8
01-Jun-14	2,443.7	19.9	85.1	0.0	1,442.7	104.5	37.1	715.5	1,160.6	173.1	16.7	128.6	6,327.5
01-Jun-15	1,993.9	53.9	33.4	1,114.1	1,110.3	5.1	3.6	430.2	2,062.9	67.3	148.8	0.0	7,023.5
01-Jun-16	2,707.3	140.5	31.5	687.1	324.1	24.2	5.3	2,028.2	570.1	138.5	71.9	2,547.5	9,276.1
01-Jun-17	280.2	132.8	8.9	2,544.0	737.1	77.9	156.4	2,012.0	800.7	87.3	50.8	1,706.3	8,594.3
01-Jun-18	657.9	19.9	208.4	66.8	1,535.6	46.2	163.5	1,678.4	2,126.0	107.8	353.2	320.3	7,283.9
01-Jun-19	1,816.6	10.8	274.7	1,011.7	588.8	63.5	188.2	592.0	4,457.6	183.8	284.5	321.5	9,793.7

**Table 33 Cleared buy bids used as replacement capacity for internal generation resources in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Total
	First Incremental Auction				Second Incremental Auction				Third Incremental Auction				
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									702.1	16.0	0.0	0.0	718.1
01-Jun-09									1,312.9	0.0	0.0	0.0	1,312.9
01-Jun-10									1,339.0	17.6	0.0	0.0	1,356.6
01-Jun-11	126.4	0.0	0.0	0.0					689.9	312.6	51.7	0.0	1,180.6
01-Jun-12	124.1	192.8	0.0	1,026.4	499.5	185.5	12.9	2,007.7	795.8	610.0	48.7	1,204.8	6,708.2
01-Jun-13	1,114.3	308.4	27.6	2,221.2	582.6	312.4	59.6	1,698.3	1,221.7	165.0	16.6	100.7	7,828.2
01-Jun-14	2,433.4	19.7	84.5	0.0	1,370.4	98.4	35.1	693.9	1,066.4	153.2	14.7	128.1	6,097.9
01-Jun-15	1,391.6	37.3	25.9	855.1	1,109.9	5.1	3.6	429.6	2,054.2	67.1	148.3	0.0	6,127.7
01-Jun-16	2,227.1	138.3	20.9	434.4	245.9	24.2	5.3	1,468.3	397.3	118.6	51.3	1,979.9	7,111.4
01-Jun-17	197.6	68.2	5.1	1,308.3	581.5	63.5	124.4	1,610.5	595.8	63.0	39.0	1,241.7	5,898.7
01-Jun-18	588.6	19.9	133.3	66.6	1,415.3	43.1	150.8	1,559.6	1,869.9	92.8	303.6	289.3	6,532.8
01-Jun-19	977.5	10.5	166.8	977.2	490.3	63.4	153.5	589.2	4,343.6	179.4	277.0	315.6	8,544.1

**Table 34 Cleared buy bids used as replacement capacity for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Total
	First Incremental Auction				Second Incremental Auction				Third Incremental Auction				
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									8.2	0.2	0.0	0.0	8.4
01-Jun-09									6.9	0.0	0.0	0.0	6.9
01-Jun-10									23.1	0.3	0.0	0.0	23.4
01-Jun-11	0.2	0.0	0.0	0.0					7.4	3.4	0.6	0.0	11.5
01-Jun-12	0.1	0.2	0.0	1.0	6.5	1.7	0.4	17.3	7.0	5.3	0.4	10.6	50.5
01-Jun-13	25.2	6.6	2.7	279.7	13.2	6.5	1.5	32.5	86.5	10.2	0.9	1.3	466.6
01-Jun-14	10.3	0.2	0.5	0.0	72.3	6.1	2.0	21.6	94.3	19.9	1.9	0.5	229.6
01-Jun-15	602.3	16.6	7.5	259.0	0.4	0.0	0.0	0.6	8.6	0.2	0.5	0.0	895.8
01-Jun-16	480.1	2.2	10.6	252.7	78.2	0.0	0.0	560.0	172.8	19.9	20.6	567.6	2,164.7
01-Jun-17	82.6	64.6	3.8	1,235.6	155.6	14.4	31.9	401.5	205.0	24.3	11.7	464.6	2,695.6
01-Jun-18	69.3	0.0	75.1	0.2	120.4	3.1	12.7	118.7	256.1	14.9	49.6	31.0	751.1
01-Jun-19	839.1	0.3	107.9	34.4	98.4	0.1	34.8	2.8	114.0	4.4	7.5	5.9	1,249.6

**Table 35 Cleared buy bids used as replacement capacity for external generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Total
	First Incremental Auction				Second Incremental Auction				Third Incremental Auction				
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									0.0	0.0	0.0	0.0	0.0
01-Jun-09									2.8	0.0	0.0	0.0	2.8
01-Jun-10									4.7	0.1	0.0	0.0	4.8
01-Jun-11									0.3	0.1	0.0	0.0	0.5
01-Jun-12	4.2	6.6	0.0	34.9					51.4	39.4	3.1	77.8	217.5
01-Jun-13	88.0	24.3	2.2	175.5	1.1	0.5	0.1	3.2	161.2	19.1	1.6	0.6	477.4
01-Jun-14	850.7	0.0	19.3	0.0	250.2	21.0	7.0	74.8	59.5	12.6	1.2	0.3	1,296.7
01-Jun-15	15.4	0.5	0.3	10.8	13.7	0.0	0.0	0.0	212.2	9.4	19.4	0.0	281.8
01-Jun-16	376.1	32.1	1.8	70.1	128.3	14.2	4.8	906.0	85.4	38.6	10.8	528.2	2,196.4
01-Jun-17	4.8	3.7	0.2	71.1	20.3	1.9	4.2	52.3	20.0	2.5	1.1	46.6	228.5
01-Jun-18	283.0	20.9	29.1	0.0	23.0	4.2	1.9	139.9	130.1	7.6	23.6	16.7	680.0
01-Jun-19	5.5	1.2	2.4	122.2	8.9	2.8	3.4	66.2	10.4	0.7	0.5	2.6	226.7

**Table 36 Cleared buy bids used as replacement capacity for demand resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Total
	First Incremental Auction				Second Incremental Auction				Third Incremental Auction				
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08									39.1	0.9	0.0	0.0	40.0
01-Jun-09									386.0	0.0	0.0	0.0	386.0
01-Jun-10									426.0	5.6	0.0	0.0	431.6
01-Jun-11	220.1	0.0	0.0	0.0					256.9	116.4	19.3	0.0	612.6
01-Jun-12	25.3	39.3	0.0	209.1	91.1	31.1	3.3	334.6	429.6	329.3	26.3	650.4	2,169.6
01-Jun-13	118.6	37.2	9.0	383.9	291.8	169.3	37.0	852.6	749.7	106.3	11.8	445.0	3,212.3
01-Jun-14	580.1	110.0	21.8	2,468.5	879.5	44.6	19.3	763.0	876.3	114.3	13.3	61.3	5,952.0
01-Jun-15	1,895.6	32.2	52.5	714.5	460.5	152.5	1.9	466.2	182.0	573.0	13.9	0.0	4,544.7
01-Jun-16	649.4	111.9	5.9	699.2	181.2	15.4	5.3	1,167.4	267.3	83.2	32.9	1,323.0	4,542.1
01-Jun-17	68.5	45.4	2.8	868.3	258.1	24.2	53.1	669.1	290.3	31.4	18.6	614.5	2,944.3
01-Jun-18	720.2	27.3	182.2	78.1	304.6	19.3	29.7	681.9	697.1	25.6	22.2	66.4	2,854.5
01-Jun-19	120.0	13.5	20.3	489.7	107.5	12.0	38.9	280.2	420.7	77.2	23.8	118.5	1,722.4

**Table 37 Cleared buy bids used as replacement capacity for energy efficiency resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)												Total
	First Incremental Auction				Second Incremental Auction				Third Incremental Auction				
	Gen	DR	EE	PJM	Gen	DR	EE	PJM	Gen	DR	EE	PJM	
01-Jun-07													
01-Jun-08													
01-Jun-09													
01-Jun-10													
01-Jun-11	0.0	0.0	0.0	0.0					0.0	0.0	0.0	0.0	0.0
01-Jun-12	5.4	3.0	0.0	13.8	0.0	0.0	0.0	0.0	5.4	4.1	0.3	8.1	40.1
01-Jun-13	0.0	0.0	0.0	0.0	3.8	2.7	0.4	16.5	11.1	1.9	0.2	0.2	36.7
01-Jun-14	0.0	0.0	0.0	0.0	25.9	1.8	0.6	14.7	0.3	0.1	0.0	0.0	43.5
01-Jun-15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-16	15.7	0.3	0.2	5.7	31.2	5.2	0.1	69.1	0.0	0.0	0.0	0.0	127.5
01-Jun-17	6.6	4.6	0.3	88.9	1.5	0.1	0.3	3.9	0.0	0.0	0.0	0.0	106.2
01-Jun-18	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.2	0.1	1.2
01-Jun-19	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.0	4.3	0.2	0.3	0.3	5.2

## Revenue

If a capacity resource is committed for a delivery year but is unable to satisfy the RPM commitment during the delivery year, the capacity market seller receives RPM revenue based on the market clearing price(s) and is charged for any replacement capacity and/or RPM commitment shortages. Table 38 through Table 45 show the following for the identified resource classifications:

- **RPM Cleared.** RPM revenue per day for cleared sell offers and make whole MW in RPM auctions for the given delivery year, or cleared and make whole MW in RPM auctions times the LDA clearing price.
- **Adjustments to Cleared.** Changes in RPM revenue per day after the auction results were posted due to Relief from Charges or various transition provisions.
- **Net Replacements.** Charges per day for net replacement capacity. For replacement transactions associated with cleared buy bids in RPM incremental auctions, the charge is equal to the LDA and product type clearing price in the RPM auction. For sources of replacement capacity other than cleared buy bids, the LDA and product type clearing price in the last RPM auction for the delivery year was imputed as the charge for replacement capacity. There is a defined price, the clearing price, for



replacement capacity associated with cleared buy bids in RPM incremental auctions, whereas there is no defined price captured in PJM's Capacity Exchange for replacement capacity sourced from a provider's own capacity portfolio or transacted through a locational UCAP transaction. The LDA and product type clearing price for the last RPM auction is the best available information as to the market value of the resources.

- Capacity Resource Deficiency Charges. Charges per day assessed on RPM Commitment Shortages. Deficiency charges decreased effective in the 2009/2010 delivery year as a result of the change in the penalty structure. Effective with the 2016/2017 Delivery Year, for a resource that is also subject to a Non-Performance Charge during one or more PAIs, the deficiency charge equals the greater of the total daily capacity resource deficiency charges calculated for product specific shortage during the period, or the total product specific non-performance charges calculated for the PAIs occurring during the period.

**Table 38 RPM revenue for all capacity resources: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)				Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments		
01-Jun-07	\$11,618,272	\$0	\$0	\$11,618,272	(\$3,202)	\$11,615,069
01-Jun-08	\$16,677,117	\$0	(\$12,070)	\$16,665,046	(\$95,058)	\$16,569,988
01-Jun-09	\$20,556,762	\$0	(\$149,837)	\$20,406,925	(\$3,570)	\$20,403,354
01-Jun-10	\$23,149,733	\$0	(\$208,950)	\$22,940,783	(\$1,743)	\$22,939,040
01-Jun-11	\$14,576,741	\$0	(\$50,990)	\$14,525,750	(\$2,293)	\$14,523,457
01-Jun-12	\$10,607,630	(\$193)	(\$97,767)	\$10,509,670	(\$9,922)	\$10,499,749
01-Jun-13	\$18,629,529	\$0	(\$410,457)	\$18,219,072	(\$10,229)	\$18,208,842
01-Jun-14	\$20,377,819	(\$1,743)	(\$479,406)	\$19,896,670	(\$167,933)	\$19,728,737
01-Jun-15	\$27,809,631	(\$45,350)	(\$1,476,240)	\$26,288,042	(\$342,238)	\$25,945,804
01-Jun-16	\$21,905,287	(\$4,222)	(\$814,068)	\$21,086,997	(\$117,849)	\$20,969,148
01-Jun-17	\$25,497,744	\$0	(\$732,187)	\$24,765,558	(\$111,951)	\$24,653,607
01-Jun-18	\$30,287,517	\$0	(\$346,950)	\$29,940,567	(\$18,004)	\$29,922,563
01-Jun-19	\$19,444,851	(\$0)	(\$352,024)	\$19,092,827	(\$1,125)	\$19,091,702

**Table 39 RPM revenue for generation resources: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)				Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments		
01-Jun-07	\$11,603,143	\$0	\$0	\$11,603,143	(\$3,202)	\$11,599,941
01-Jun-08	\$16,580,270	\$0	(\$11,670)	\$16,568,599	(\$73,791)	\$16,494,808
01-Jun-09	\$20,376,592	\$0	(\$109,372)	\$20,267,220	(\$92)	\$20,267,128
01-Jun-10	\$22,984,703	\$0	(\$183,135)	\$22,801,568	(\$230)	\$22,801,338
01-Jun-11	\$14,423,911	\$0	(\$34,724)	\$14,389,187	(\$2,293)	\$14,386,894
01-Jun-12	\$9,851,831	\$0	(\$77,479)	\$9,774,351	(\$4,237)	\$9,770,114
01-Jun-13	\$17,039,629	\$0	(\$184,838)	\$16,854,792	(\$5,384)	\$16,849,408
01-Jun-14	\$18,395,288	(\$1,743)	(\$217,933)	\$18,175,612	(\$126,039)	\$18,049,574
01-Jun-15	\$25,114,429	(\$828)	(\$931,322)	\$24,182,278	(\$330,264)	\$23,852,015
01-Jun-16	\$20,434,637	(\$1,139)	(\$554,249)	\$19,879,248	(\$63,152)	\$19,816,097
01-Jun-17	\$23,850,366	\$0	(\$540,937)	\$23,309,429	(\$105,973)	\$23,203,456
01-Jun-18	\$28,257,797	\$0	(\$272,479)	\$27,985,318	(\$17,751)	\$27,967,566
01-Jun-19	\$18,166,373	\$0	(\$305,869)	\$17,860,504	(\$1,113)	\$17,859,392

**Table 40 RPM revenue for internal generation resources: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)					
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$11,534,520	\$0	\$0	\$11,534,520	(\$3,202)	\$11,531,318
01-Jun-08	\$16,397,655	\$0	(\$11,562)	\$16,386,093	(\$73,791)	\$16,312,301
01-Jun-09	\$20,196,185	\$0	(\$118,744)	\$20,077,441	(\$92)	\$20,077,349
01-Jun-10	\$22,664,116	\$0	(\$172,285)	\$22,491,831	(\$230)	\$22,491,601
01-Jun-11	\$14,229,190	\$0	(\$34,652)	\$14,194,537	(\$2,293)	\$14,192,244
01-Jun-12	\$9,829,086	\$0	(\$76,532)	\$9,752,553	(\$2,181)	\$9,750,372
01-Jun-13	\$16,977,778	\$0	(\$178,257)	\$16,799,521	(\$5,384)	\$16,794,137
01-Jun-14	\$18,008,882	(\$1,743)	(\$214,783)	\$17,792,356	(\$126,039)	\$17,666,317
01-Jun-15	\$24,383,986	(\$828)	(\$961,048)	\$23,422,109	(\$327,280)	\$23,094,829
01-Jun-16	\$19,751,816	(\$1,139)	(\$452,422)	\$19,298,255	(\$63,041)	\$19,235,214
01-Jun-17	\$23,221,398	\$0	(\$525,308)	\$22,696,090	(\$105,973)	\$22,590,117
01-Jun-18	\$27,492,606	\$0	(\$247,487)	\$27,245,118	(\$17,751)	\$27,227,367
01-Jun-19	\$17,910,580	\$0	(\$296,549)	\$17,614,031	(\$1,113)	\$17,612,918

**Table 41 RPM revenue for internal generation resources in service: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)					
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$11,531,795	\$0	\$0	\$11,531,795	(\$3,202)	\$11,528,593
01-Jun-08	\$16,385,365	\$0	(\$11,477)	\$16,373,888	(\$72,650)	\$16,301,238
01-Jun-09	\$20,133,201	\$0	(\$125,892)	\$20,007,309	(\$92)	\$20,007,217
01-Jun-10	\$22,548,233	\$0	(\$170,155)	\$22,378,078	(\$230)	\$22,377,848
01-Jun-11	\$13,955,282	\$0	(\$30,743)	\$13,924,539	(\$290)	\$13,924,249
01-Jun-12	\$9,654,941	\$0	(\$75,481)	\$9,579,460	(\$1,109)	\$9,578,351
01-Jun-13	\$16,608,179	\$0	(\$162,893)	\$16,445,285	(\$5,384)	\$16,439,902
01-Jun-14	\$17,597,159	(\$1,743)	(\$233,428)	\$17,361,988	(\$50,140)	\$17,311,848
01-Jun-15	\$23,531,852	(\$828)	(\$866,921)	\$22,664,102	(\$65,481)	\$22,598,622
01-Jun-16	\$18,562,893	(\$1,139)	(\$306,231)	\$18,255,523	(\$13,901)	\$18,241,623
01-Jun-17	\$21,312,051	\$0	(\$228,181)	\$21,083,871	(\$8,368)	\$21,075,503
01-Jun-18	\$24,949,680	\$0	(\$118,411)	\$24,831,268	(\$1,642)	\$24,829,626
01-Jun-19	\$16,309,581	\$0	(\$255,139)	\$16,054,442	(\$1,113)	\$16,053,329

**Table 42 RPM revenue for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)					
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$2,725	\$0	\$0	\$2,725	\$0	\$2,725
01-Jun-08	\$12,290	\$0	(\$85)	\$12,205	(\$1,142)	\$11,063
01-Jun-09	\$62,983	\$0	\$7,148	\$70,131	\$0	\$70,131
01-Jun-10	\$115,883	\$0	(\$2,130)	\$113,753	\$0	\$113,753
01-Jun-11	\$273,908	\$0	(\$3,910)	\$269,998	(\$2,002)	\$267,996
01-Jun-12	\$174,145	\$0	(\$1,051)	\$173,093	(\$1,071)	\$172,022
01-Jun-13	\$369,599	\$0	(\$15,364)	\$354,235	\$0	\$354,235
01-Jun-14	\$411,723	\$0	\$18,646	\$430,368	(\$75,899)	\$354,469
01-Jun-15	\$852,134	\$0	(\$94,127)	\$758,007	(\$261,800)	\$496,207
01-Jun-16	\$1,188,923	\$0	(\$146,191)	\$1,042,732	(\$49,141)	\$993,591
01-Jun-17	\$1,909,347	\$0	(\$297,127)	\$1,612,219	(\$97,606)	\$1,514,614
01-Jun-18	\$2,542,926	\$0	(\$129,076)	\$2,413,850	(\$16,109)	\$2,397,741
01-Jun-19	\$1,600,999	\$0	(\$41,410)	\$1,559,589	\$0	\$1,559,589

**Table 43 RPM revenue for external generation resources: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)				Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments		
01-Jun-07	\$68,623	\$0	\$0	\$68,623	\$0	\$68,623
01-Jun-08	\$182,615	\$0	(\$108)	\$182,507	\$0	\$182,507
01-Jun-09	\$180,408	\$0	\$9,372	\$189,780	\$0	\$189,780
01-Jun-10	\$320,587	\$0	(\$10,850)	\$309,737	\$0	\$309,737
01-Jun-11	\$194,722	\$0	(\$72)	\$194,650	\$0	\$194,650
01-Jun-12	\$22,745	\$0	(\$947)	\$21,798	(\$2,056)	\$19,742
01-Jun-13	\$61,852	\$0	(\$6,581)	\$55,271	\$0	\$55,271
01-Jun-14	\$386,406	\$0	(\$3,150)	\$383,256	\$0	\$383,256
01-Jun-15	\$730,443	\$0	\$29,726	\$760,169	(\$2,983)	\$757,186
01-Jun-16	\$682,820	\$0	(\$101,827)	\$580,994	(\$111)	\$580,883
01-Jun-17	\$628,968	\$0	(\$15,629)	\$613,339	\$0	\$613,339
01-Jun-18	\$765,191	\$0	(\$24,992)	\$740,199	\$0	\$740,199
01-Jun-19	\$255,793	\$0	(\$9,320)	\$246,473	\$0	\$246,473

**Table 44 RPM revenue for demand resources: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)				Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments		
01-Jun-07	\$15,129	\$0	\$0	\$15,129	\$0	\$15,129
01-Jun-08	\$96,847	\$0	(\$400)	\$96,447	(\$21,267)	\$75,180
01-Jun-09	\$180,170	\$0	(\$40,465)	\$139,704	(\$3,478)	\$136,226
01-Jun-10	\$165,030	\$0	(\$25,815)	\$139,215	(\$1,513)	\$137,702
01-Jun-11	\$152,448	\$0	(\$16,267)	\$136,181	\$0	\$136,181
01-Jun-12	\$724,543	(\$193)	(\$19,067)	\$705,283	(\$5,478)	\$699,806
01-Jun-13	\$1,530,726	\$0	(\$229,965)	\$1,300,761	(\$3,569)	\$1,297,192
01-Jun-14	\$1,866,617	\$0	(\$292,007)	\$1,574,610	(\$41,876)	\$1,532,734
01-Jun-15	\$2,513,090	(\$44,521)	(\$604,708)	\$1,863,860	(\$11,775)	\$1,852,085
01-Jun-16	\$1,282,405	(\$3,083)	(\$255,866)	\$1,023,455	(\$54,662)	\$968,793
01-Jun-17	\$1,411,357	\$0	(\$208,070)	\$1,203,287	(\$4,897)	\$1,198,390
01-Jun-18	\$1,747,239	(\$0)	(\$78,208)	\$1,669,032	(\$253)	\$1,668,779
01-Jun-19	\$1,025,555	(\$0)	(\$45,048)	\$980,507	(\$12)	\$980,495

**Table 45 RPM revenue for energy efficiency resources: June 1, 2007 to June 1, 2019**

	Revenue (\$ per Day)				Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
	RPM Cleared	Adjustments to Cleared	Net Replacements	RPM Commitments		
01-Jun-07	\$0	\$0	\$0	\$0	\$0	\$0
01-Jun-08	\$0	\$0	\$0	\$0	\$0	\$0
01-Jun-09	\$0	\$0	\$0	\$0	\$0	\$0
01-Jun-10	\$0	\$0	\$0	\$0	\$0	\$0
01-Jun-11	\$382	\$0	\$1	\$383	\$0	\$383
01-Jun-12	\$31,256	\$0	(\$1,221)	\$30,036	(\$207)	\$29,829
01-Jun-13	\$59,173	\$0	\$4,346	\$63,519	(\$1,277)	\$62,242
01-Jun-14	\$115,914	\$0	\$30,533	\$146,447	(\$18)	\$146,430
01-Jun-15	\$182,112	\$0	\$59,791	\$241,903	(\$200)	\$241,704
01-Jun-16	\$188,246	\$0	(\$3,953)	\$184,293	(\$35)	\$184,258
01-Jun-17	\$236,021	\$0	\$16,821	\$252,841	(\$1,081)	\$251,761
01-Jun-18	\$282,482	\$0	\$3,736	\$286,218	\$0	\$286,218
01-Jun-19	\$252,923	\$0	(\$1,107)	\$251,815	\$0	\$251,815

Table 46 through Table 53 show the following for the identified resource classifications:

- RPM Cleared. Weighted average RPM price for cleared sell offers and make whole MW in RPM auctions for the given delivery year.
- Adjustments to Cleared. Weighted average changes in RPM revenue after the auction results were posted due to Relief from Charges or various transition provisions.
- Net Replacements. Weighted average charge for net replacement capacity. For replacement transactions associated with cleared buy bids in RPM incremental auctions, the charge is equal to the LDA and product type clearing price in the RPM auction. For sources of replacement capacity other than cleared buy bids, the LDA and product type clearing price in the last RPM auction for the delivery year was imputed as the charge for replacement capacity. There is a defined price, the clearing price, for replacement capacity associated with cleared buy bids in RPM incremental auctions, whereas there is no defined price captured in PJM's Capacity Exchange for replacement capacity sourced from a provider's own capacity portfolio or transacted through a locational UCAP transaction. The LDA and product type clearing price for the last RPM auction is the best available information as to the market value of the resources.
- Capacity Resource Deficiency Charges. Weighted average charge assessed on RPM Commitment Shortages. Deficiency charges decreased effective in the 2009/2010 Delivery Year as a result of the change in the penalty structure.

**Table 46 Weighted average RPM price for all capacity resources: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$89.78		\$89.78		\$89.78	(\$395.34)	\$89.76
01-Jun-08	\$127.67		\$127.67	(\$15.75)	\$128.33	(\$385.94)	\$127.84
01-Jun-09	\$153.37		\$153.37	(\$72.45)	\$154.64	(\$242.87)	\$154.63
01-Jun-10	\$172.71		\$172.71	(\$50.00)	\$176.66	(\$198.08)	\$176.66
01-Jun-11	\$108.63		\$108.63	(\$7.59)	\$113.96	(\$28.91)	\$114.01
01-Jun-12	\$75.07	(\$16.46)	\$75.08	(\$10.40)	\$79.69	(\$63.11)	\$79.71
01-Jun-13	\$116.55		\$116.55	(\$33.55)	\$123.43	(\$156.41)	\$123.41
01-Jun-14	\$126.40	(\$185.46)	\$126.40	(\$35.21)	\$134.81	(\$138.91)	\$134.78
01-Jun-15	\$159.97	(\$139.07)	\$160.01	(\$124.58)	\$162.60	(\$187.84)	\$162.32
01-Jun-16	\$121.85	(\$171.63)	\$121.84	(\$50.38)	\$128.90	(\$127.49)	\$128.91
01-Jun-17	\$141.19		\$141.19	(\$52.36)	\$148.65	(\$179.04)	\$148.53
01-Jun-18	\$172.09		\$172.09	(\$28.77)	\$182.63	(\$119.63)	\$182.69
01-Jun-19	\$109.82		\$109.82	(\$28.62)	\$115.88	(\$120.96)	\$115.88

**Table 47 Weighted average RPM price for generation resources: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$89.75		\$89.75		\$89.75	(\$395.34)	\$89.73
01-Jun-08	\$127.47		\$127.47	(\$16.06)	\$128.10	(\$392.72)	\$127.71
01-Jun-09	\$153.05		\$153.05	(\$68.64)	\$154.07	(\$229.58)	\$154.07
01-Jun-10	\$172.72		\$172.72	(\$50.00)	\$176.20	(\$209.15)	\$176.20
01-Jun-11	\$109.04		\$109.04	(\$6.13)	\$113.65	(\$28.91)	\$113.70
01-Jun-12	\$74.70		\$74.70	(\$10.89)	\$78.34	(\$36.15)	\$78.38
01-Jun-13	\$115.01		\$115.01	(\$20.44)	\$121.15	(\$251.57)	\$121.13
01-Jun-14	\$126.69	(\$185.46)	\$126.69	(\$30.74)	\$131.62	(\$127.40)	\$131.65
01-Jun-15	\$160.09	(\$165.68)	\$160.09	(\$126.61)	\$161.73	(\$187.72)	\$161.42
01-Jun-16	\$124.02	(\$219.00)	\$124.02	(\$48.54)	\$129.64	(\$134.80)	\$129.62
01-Jun-17	\$142.99		\$142.99	(\$52.48)	\$148.95	(\$180.35)	\$148.83
01-Jun-18	\$174.15		\$174.15	(\$29.86)	\$182.74	(\$118.74)	\$182.81
01-Jun-19	\$110.88		\$110.88	(\$30.25)	\$116.19	(\$125.05)	\$116.19

**Table 48 Weighted average RPM price for internal generation resources: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$90.35		\$90.35		\$90.35	(\$395.34)	\$90.33
01-Jun-08	\$127.66		\$127.66	(\$16.16)	\$128.29	(\$392.72)	\$127.90
01-Jun-09	\$153.68		\$153.68	(\$64.97)	\$154.93	(\$229.58)	\$154.93
01-Jun-10	\$173.07		\$173.07	(\$50.00)	\$176.40	(\$209.15)	\$176.40
01-Jun-11	\$109.07		\$109.07	(\$6.13)	\$113.73	(\$28.91)	\$113.79
01-Jun-12	\$75.40		\$75.40	(\$10.95)	\$79.05	(\$35.87)	\$79.07
01-Jun-13	\$116.50		\$116.50	(\$20.82)	\$122.47	(\$251.57)	\$122.45
01-Jun-14	\$127.26	(\$185.46)	\$127.25	(\$34.22)	\$131.57	(\$127.40)	\$131.60
01-Jun-15	\$160.92	(\$165.68)	\$160.92	(\$127.88)	\$162.64	(\$188.55)	\$162.33
01-Jun-16	\$125.80	(\$219.00)	\$125.80	(\$53.35)	\$129.94	(\$134.96)	\$129.92
01-Jun-17	\$143.50		\$143.50	(\$52.30)	\$149.54	(\$180.35)	\$149.42
01-Jun-18	\$174.57		\$174.57	(\$29.78)	\$182.64	(\$118.74)	\$182.70
01-Jun-19	\$111.24		\$111.24	(\$30.68)	\$116.38	(\$125.05)	\$116.38

**Table 49 Weighted average RPM price for internal generation resources in service: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$90.36		\$90.36		\$90.36	(\$395.34)	\$90.35
01-Jun-08	\$127.68		\$127.68	(\$16.23)	\$128.29	(\$397.43)	\$127.91
01-Jun-09	\$153.77		\$153.77	(\$62.01)	\$155.22	(\$229.58)	\$155.22
01-Jun-10	\$173.11		\$173.11	(\$50.00)	\$176.42	(\$209.15)	\$176.42
01-Jun-11	\$109.22		\$109.22	(\$6.31)	\$113.30	(\$132.00)	\$113.30
01-Jun-12	\$75.81		\$75.81	(\$10.70)	\$79.63	(\$84.04)	\$79.63
01-Jun-13	\$117.20		\$117.20	(\$20.15)	\$123.07	(\$251.57)	\$123.05
01-Jun-14	\$127.29	(\$185.46)	\$127.29	(\$37.03)	\$131.60	(\$137.29)	\$131.59
01-Jun-15	\$161.07	(\$165.68)	\$161.07	(\$130.23)	\$162.54	(\$165.56)	\$162.53
01-Jun-16	\$125.52	(\$219.00)	\$125.51	(\$49.89)	\$128.79	(\$114.31)	\$128.80
01-Jun-17	\$143.76		\$143.76	(\$38.80)	\$148.10	(\$165.69)	\$148.09
01-Jun-18	\$175.04		\$175.04	(\$27.19)	\$179.69	(\$149.29)	\$179.70
01-Jun-19	\$112.33		\$112.33	(\$28.44)	\$117.85	(\$125.05)	\$117.85

**Table 50 Weighted average RPM price for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$58.23		\$58.23		\$58.23		\$58.23
01-Jun-08	\$111.83		\$111.83	(\$10.00)	\$120.36	(\$223.84)	\$114.88
01-Jun-09	\$130.00		\$130.00	(\$35.30)	\$102.08		\$102.08
01-Jun-10	\$165.33		\$165.33	(\$50.00)	\$172.80		\$172.80
01-Jun-11	\$101.90		\$101.90	(\$5.01)	\$141.50	(\$25.97)	\$146.37
01-Jun-12	\$58.06		\$58.06	\$15.67	\$56.45	(\$22.51)	\$56.98
01-Jun-13	\$91.95		\$91.95	(\$32.04)	\$100.06		\$100.06
01-Jun-14	\$125.70		\$125.70	(\$693.14)	\$130.32	(\$121.61)	\$132.35
01-Jun-15	\$156.88		\$156.88	(\$109.62)	\$165.75	(\$195.33)	\$153.49
01-Jun-16	\$130.48		\$130.48	(\$62.43)	\$154.01	(\$142.23)	\$154.65
01-Jun-17	\$140.67		\$140.67	(\$71.39)	\$171.30	(\$181.73)	\$170.67
01-Jun-18	\$170.15		\$170.15	(\$32.62)	\$219.67	(\$116.31)	\$220.99
01-Jun-19	\$101.22		\$101.22	(\$59.72)	\$103.12		\$103.12

**Table 51 Weighted average RPM price for external generation resources: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$42.34		\$42.34		\$42.34		\$42.34
01-Jun-08	\$112.28		\$112.28	(\$10.00)	\$112.97		\$112.97
01-Jun-09	\$104.76		\$104.76	(\$40.00)	\$97.00		\$97.00
01-Jun-10	\$151.15		\$151.15	(\$50.00)	\$162.68		\$162.68
01-Jun-11	\$106.87		\$106.87	(\$5.00)	\$107.68		\$107.68
01-Jun-12	\$15.00		\$15.00	(\$7.68)	\$15.65	(\$36.46)	\$14.77
01-Jun-13	\$25.47		\$25.47	(\$13.73)	\$28.35		\$28.35
01-Jun-14	\$105.06		\$105.06	(\$3.88)	\$133.71		\$133.71
01-Jun-15	\$136.46		\$136.46	(\$185.90)	\$137.89	(\$126.94)	\$137.94
01-Jun-16	\$87.98		\$87.98	(\$34.65)	\$120.48	(\$78.97)	\$120.49
01-Jun-17	\$126.27		\$126.27	(\$59.13)	\$130.04		\$130.04
01-Jun-18	\$160.13		\$160.13	(\$30.73)	\$186.67		\$186.67
01-Jun-19	\$90.77		\$90.77	(\$20.90)	\$103.91		\$103.91

**Table 52 Weighted average RPM price for demand resources: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07	\$118.56		\$118.56		\$118.56		\$118.56
01-Jun-08	\$173.13		\$173.13	(\$10.00)	\$185.69	(\$364.16)	\$163.08
01-Jun-09	\$201.78		\$201.78	(\$85.24)	\$334.06	(\$243.24)	\$337.28
01-Jun-10	\$171.39		\$171.39	(\$50.00)	\$311.72	(\$196.50)	\$313.74
01-Jun-11	\$83.46		\$83.46	(\$15.46)	\$175.90		\$175.90
01-Jun-12	\$82.78	(\$16.46)	\$82.87	(\$8.46)	\$108.72	(\$156.96)	\$108.46
01-Jun-13	\$142.00		\$142.00	(\$69.38)	\$174.24	(\$117.02)	\$174.48
01-Jun-14	\$124.92		\$124.92	(\$43.38)	\$191.76	(\$190.87)	\$191.79
01-Jun-15	\$159.31	(\$138.65)	\$159.74	(\$125.21)	\$175.44	(\$190.53)	\$175.35
01-Jun-16	\$96.53	(\$158.93)	\$96.44	(\$53.30)	\$120.91	(\$120.03)	\$120.96
01-Jun-17	\$118.89		\$118.89	(\$53.75)	\$150.41	(\$161.62)	\$150.37
01-Jun-18	\$152.79		\$152.79	(\$24.58)	\$202.23	(\$252.76)	\$202.21
01-Jun-19	\$95.82		\$95.82	(\$21.06)	\$114.49	(\$30.01)	\$114.49

**Table 53 Weighted average RPM price for energy efficiency resources: June 1, 2007 to June 1, 2019**

	Weighted Average Price (\$ per MW-Day)						
	RPM Cleared	Adjustments to Cleared	Adjusted RPM Cleared	Net Replacements	RPM Commitments	Capacity Resource Deficiency Charges	RPM Commitments Less Commitment Shortages
01-Jun-07							
01-Jun-08							
01-Jun-09							
01-Jun-10							
01-Jun-11	\$5.00		\$5.00	(\$5.00)	\$5.00		\$5.00
01-Jun-12	\$46.92		\$46.92	(\$34.97)	\$47.59	(\$40.53)	\$47.64
01-Jun-13	\$65.44		\$65.44	(\$36.04)	\$61.98	(\$94.57)	\$61.55
01-Jun-14	\$107.56		\$107.56	(\$149.16)	\$114.20	(\$88.75)	\$114.20
01-Jun-15	\$153.09		\$153.09	(\$178.00)	\$158.57	(\$221.72)	\$158.54
01-Jun-16	\$109.24		\$109.24	\$64.69	\$103.29	(\$70.50)	\$103.30
01-Jun-17	\$122.78		\$122.78	(\$85.99)	\$119.38	(\$146.04)	\$119.29
01-Jun-18	\$123.02		\$123.02	(\$15.02)	\$112.46		\$112.46
01-Jun-19	\$100.03		\$100.03	(\$22.14)	\$101.60		\$101.60

## Parent Company Analysis

This section reports data on net replacement capacity activities aggregated to a parent company level.

Table 54 through Table 61 show the number of companies by net replacement share for the identified resource classifications. The number of companies includes both companies that replaced RPM commitments and companies that provided replacement capacity.

Table 62 through Table 69 show, for the identified resource classifications:

- RPM Cleared. Cleared sell offers and make whole MW in RPM auctions for the given delivery year and the net replacement percentage range at the parent company level.
- Net Replacements. RPM commitment additions on the replacement resources for the given replacement percentage range at the parent company level less RPM commitment reductions using replacement capacity.
- Total Net Replacements. RPM commitment additions on the replacement resources less RPM commitment reductions using replacement capacity, or the sum of Net Replacements for all the replacement percentage ranges.

Figure 1 through Figure 8 show scatter plots of company replacement shares for the identified resource classifications. Figure 9 through Figure 16 show the number of companies by net replacement percent, calculated using data for June 1 of each year from 2007 through 2019, for the identified resource classifications.

A higher percent of companies with cleared generation resources, internal generation resources, internal generation resources in service, and external generation resources replaced less than or equal to 25 percent of the cleared capacity than companies with cleared resources in the other identified resources classifications. A higher percent of companies with cleared DR, EE resources, internal generation resources not in service, and external generation resources replaced greater than 75 percent of cleared capacity

for the given resource classification than companies with cleared resources in the other identified resources classifications.

**Table 54 Number of parent companies by replacement percentage for all capacity resources: June 1, 2007 to June 1, 2019**

	Number of Companies					
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	100 Percent
01-Jun-07	63	0	0	0	0	0
01-Jun-08	34	35	1	0	0	0
01-Jun-09	41	36	1	1	1	0
01-Jun-10	43	28	5	1	1	5
01-Jun-11	46	36	5	3	3	3
01-Jun-12	62	40	10	2	4	6
01-Jun-13	69	45	11	6	2	8
01-Jun-14	71	52	7	4	5	6
01-Jun-15	68	63	6	4	2	4
01-Jun-16	69	56	14	3	6	4
01-Jun-17	68	68	12	0	0	9
01-Jun-18	72	69	6	2	5	12
01-Jun-19	78	60	14	3	5	6

**Table 55 Number of parent companies by replacement percentage for generation resources: June 1, 2007 to June 1, 2019**

	Number of Companies					
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	100 Percent
01-Jun-07	60	0	0	0	0	0
01-Jun-08	31	34	1	0	0	0
01-Jun-09	39	35	1	0	0	0
01-Jun-10	41	28	5	1	0	3
01-Jun-11	41	36	4	0	3	3
01-Jun-12	53	36	4	2	1	4
01-Jun-13	62	41	3	2	0	2
01-Jun-14	65	46	3	1	1	1
01-Jun-15	63	57	3	1	0	1
01-Jun-16	60	53	9	3	3	2
01-Jun-17	66	61	4	0	0	7
01-Jun-18	68	63	2	1	4	8
01-Jun-19	74	55	9	1	3	6



**Table 56 Number of parent companies by replacement percentage for internal generation resources: June 1, 2007 to June 1, 2019**

	Number of Companies					100 Percent
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	
01-Jun-07	56	0	0	0	0	0
01-Jun-08	26	34	1	0	0	0
01-Jun-09	34	33	1	0	0	0
01-Jun-10	35	28	5	1	0	3
01-Jun-11	34	37	4	0	3	3
01-Jun-12	46	34	4	1	1	3
01-Jun-13	55	38	3	2	0	1
01-Jun-14	54	44	2	1	1	2
01-Jun-15	52	55	3	1	0	1
01-Jun-16	49	54	9	1	1	1
01-Jun-17	56	57	3	1	0	6
01-Jun-18	57	62	1	1	3	7
01-Jun-19	63	55	9	1	2	5

**Table 57 Number of parent companies by replacement percentage for internal generation resources in service: June 1, 2007 to June 1, 2019**

	Number of Companies					100 Percent
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	
01-Jun-07	56	0	0	0	0	0
01-Jun-08	25	34	1	0	0	0
01-Jun-09	34	33	1	0	0	0
01-Jun-10	35	28	5	1	0	2
01-Jun-11	36	35	4	0	2	2
01-Jun-12	43	31	3	2	1	2
01-Jun-13	50	38	2	2	0	1
01-Jun-14	48	43	1	2	1	1
01-Jun-15	47	53	2	1	0	0
01-Jun-16	49	52	7	1	1	1
01-Jun-17	54	54	4	1	0	3
01-Jun-18	61	52	1	1	2	3
01-Jun-19	60	52	8	1	2	2

**Table 58 Number of parent companies by replacement percentage for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	Number of Companies					100 Percent
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	
01-Jun-07	2	0	0	0	0	0
01-Jun-08	2	2	0	0	0	1
01-Jun-09	4	3	0	1	0	0
01-Jun-10	2	5	1	1	0	1
01-Jun-11	4	7	3	0	0	3
01-Jun-12	15	5	2	0	0	2
01-Jun-13	18	3	3	0	0	2
01-Jun-14	22	6	1	0	0	3
01-Jun-15	15	7	1	0	0	2
01-Jun-16	9	6	4	1	0	2
01-Jun-17	13	7	1	1	0	4
01-Jun-18	8	12	2	0	2	5
01-Jun-19	15	10	1	1	0	4

**Table 59 Number of parent companies by replacement percentage for external generation resources: June 1, 2007 to June 1, 2019**

	Number of Companies					
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	100 Percent
01-Jun-07	16	0	0	0	0	0
01-Jun-08	14	4	0	0	0	0
01-Jun-09	17	3	0	0	0	0
01-Jun-10	17	2	0	0	0	0
01-Jun-11	17	2	0	0	0	0
01-Jun-12	18	3	0	1	0	1
01-Jun-13	18	6	0	0	1	1
01-Jun-14	22	7	0	0	2	0
01-Jun-15	22	11	1	0	0	0
01-Jun-16	18	11	2	2	2	5
01-Jun-17	21	14	1	0	0	2
01-Jun-18	27	4	1	0	1	4
01-Jun-19	24	4	1	0	1	2

**Table 60 Number of parent companies by replacement percentage for demand resources: June 1, 2007 to June 1, 2019**

	Number of Companies					
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	100 Percent
01-Jun-07	4	0	0	0	0	0
01-Jun-08	4	1	0	0	0	0
01-Jun-09	3	1	0	1	1	0
01-Jun-10	2	1	0	0	1	2
01-Jun-11	7	0	3	1	0	3
01-Jun-12	21	10	6	0	4	2
01-Jun-13	19	9	8	4	5	8
01-Jun-14	15	9	10	2	6	8
01-Jun-15	13	11	8	5	2	4
01-Jun-16	19	5	8	4	3	5
01-Jun-17	9	9	10	2	1	8
01-Jun-18	7	9	7	1	1	8
01-Jun-19	10	7	6	3	3	3

**Table 61 Number of parent companies by replacement percentage for energy efficiency resources: June 1, 2007 to June 1, 2019**

	Number of Companies					
	0 Percent	> 0 Percent and ≤ 25 Percent	> 25 Percent and ≤ 50 Percent	> 50 Percent and ≤ 75 Percent	> 75 Percent and < 100 Percent	100 Percent
01-Jun-07						
01-Jun-08						
01-Jun-09						
01-Jun-10						
01-Jun-11	4	0	0	0	0	0
01-Jun-12	6	0	1	1	0	1
01-Jun-13	7	0	1	0	1	2
01-Jun-14	10	0	0	0	2	3
01-Jun-15	16	0	0	0	0	0
01-Jun-16	10	2	1	0	2	2
01-Jun-17	10	3	0	1	0	2
01-Jun-18	10	1	2	0	0	3
01-Jun-19	10	1	0	0	0	3



**Table 65 RPM cleared and replacement capacity by replacement percentage at parent company level for internal generation resources in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)																	
	0 Percent			> 0 Percent and <= 25 Percent			> 25 Percent and <= 50 Percent			> 50 Percent and <= 75 Percent			> 75 Percent and < 100 Percent			100 Percent		
	RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements	
01-Jun-07	127,614.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	54,894.9	9.7	73,349.4	(672.0)	89.8	(44.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(707.2)
01-Jun-09	22,721.9	133.7	108,202.0	(2,161.2)	6.8	(2.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(2,030.3)
01-Jun-10	45,096.3	208.0	84,234.2	(3,108.7)	715.3	(293.3)	5.8	(3.3)	0.0	0.0	199.8	(199.8)	(3,403.1)					
01-Jun-11	37,284.1	240.9	86,676.1	(3,719.9)	3,566.6	(1,156.9)	0.0	0.0	229.4	(221.8)	13.4	(13.4)	(4,871.1)					
01-Jun-12	12,955.4	1,005.5	107,659.8	(4,429.4)	3,456.9	(1,531.5)	2,811.0	(1,624.4)	44.8	(42.9)	433.2	(433.2)	(7,055.9)					
01-Jun-13	36,892.4	207.4	101,163.0	(6,095.1)	466.7	(206.5)	3,142.3	(1,940.5)	0.0	0.0	48.1	(48.1)	(8,082.8)					
01-Jun-14	29,170.0	206.0	108,469.5	(6,049.4)	3.7	(1.5)	210.3	(108.8)	355.0	(327.9)	22.5	(22.5)	(6,304.1)					
01-Jun-15	11,124.3	37.5	134,429.3	(6,433.4)	340.7	(152.5)	197.1	(108.4)	0.0	0.0	0.0	0.0	(6,656.8)					
01-Jun-16	7,145.5	108.1	139,218.0	(5,460.5)	1,030.9	(386.2)	203.1	(119.8)	110.6	(100.0)	179.5	(179.5)	(6,137.9)					
01-Jun-17	9,365.3	114.8	137,968.9	(5,482.4)	525.4	(178.3)	173.0	(125.0)	0.0	0.0	210.4	(210.4)	(5,881.3)					
01-Jun-18	60,059.7	2,248.6	80,748.8	(5,212.7)	50.9	(14.0)	425.2	(257.6)	1,255.2	(1,117.7)	0.9	(0.9)	(4,354.3)					
01-Jun-19	52,673.8	2,486.5	73,918.9	(4,178.1)	16,657.8	(5,665.8)	515.7	(306.3)	1,421.2	(1,298.4)	10.0	(10.0)	(8,972.1)					

**Table 66 RPM cleared and replacement capacity by replacement percentage at parent company level for internal generation resources not in service: June 1, 2007 to June 1, 2019**

	UCAP (MW)																	
	0 Percent			> 0 Percent and <= 25 Percent			> 25 Percent and <= 50 Percent			> 50 Percent and <= 75 Percent			> 75 Percent and < 100 Percent			100 Percent		
	RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements	
01-Jun-07	46.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	37.3	0.0	65.0	(0.9)	0.0	0.0	0.0	0.0	0.0	0.0	7.6	(7.6)	(8.5)					
01-Jun-09	366.5	216.2	106.5	(5.2)	0.0	0.0	11.5	(8.5)	0.0	0.0	0.0	0.0	202.5					
01-Jun-10	51.5	0.0	607.7	(11.1)	7.6	(3.4)	14.3	(8.3)	0.0	0.0	19.8	(19.8)	(42.6)					
01-Jun-11	597.7	0.0	1,246.0	(45.6)	167.7	(57.7)	0.0	0.0	0.0	0.0	676.6	(676.6)	(779.9)					
01-Jun-12	1,945.8	141.2	943.5	(33.6)	102.2	(32.7)	0.0	0.0	0.0	0.0	7.8	(7.8)	67.1					
01-Jun-13	1,577.5	13.8	1,369.1	(88.0)	961.9	(294.1)	0.0	0.0	0.0	0.0	111.2	(111.2)	(479.5)					
01-Jun-14	1,695.5	160.1	1,546.6	(111.3)	16.0	(4.6)	0.0	0.0	0.0	0.0	17.3	(17.3)	26.9					
01-Jun-15	3,399.5	45.1	706.6	(18.1)	854.7	(414.7)	0.0	0.0	0.0	0.0	471.0	(471.0)	(858.7)					
01-Jun-16	2,909.0	11.5	1,750.5	(71.5)	3,499.4	(1,330.4)	4.5	(2.6)	0.0	0.0	948.6	(948.6)	(2,341.6)					
01-Jun-17	4,957.8	24.9	4,326.3	(727.4)	906.1	(369.5)	1,030.5	(737.1)	0.0	0.0	2,352.8	(2,352.8)	(4,161.9)					
01-Jun-18	2,224.4	44.1	8,973.1	(447.5)	87.6	(25.1)	0.0	0.0	2,181.8	(2,050.0)	1,478.2	(1,478.2)	(3,956.7)					
01-Jun-19	6,299.9	572.5	8,377.1	(187.1)	2.0	(0.6)	136.0	(75.9)	0.0	0.0	1,002.3	(1,002.3)	(693.4)					

**Table 67 RPM cleared and replacement capacity by replacement percentage at parent company level for external generation resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)																	
	0 Percent			> 0 Percent and <= 25 Percent			> 25 Percent and <= 50 Percent			> 50 Percent and <= 75 Percent			> 75 Percent and < 100 Percent			100 Percent		
	RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements		RPM Cleared	Net Replacements	
01-Jun-07	1,620.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	154.3	0.0	1,472.1	(10.8)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(10.8)					
01-Jun-09	460.9	399.4	1,261.2	(165.1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	234.3					
01-Jun-10	957.3	14.1	1,163.7	(231.1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(217.0)					
01-Jun-11	592.0	219.8	1,230.0	(234.2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(14.4)					
01-Jun-12	1,118.5	37.0	238.3	(35.6)	0.0	0.0	114.0	(79.0)	0.0	0.0	45.7	(45.7)	(123.3)					
01-Jun-13	837.8	1.1	1,084.3	(17.3)	0.0	0.0	0.0	0.0	217.6	(174.2)	288.8	(288.8)	(479.2)					
01-Jun-14	1,205.8	491.4	1,203.3	(90.4)	0.0	0.0	0.0	0.0	1,268.8	(1,212.6)	0.0	0.0	(811.6)					
01-Jun-15	2,275.5	451.4	2,681.7	(154.2)	395.7	(137.3)	0.0	0.0	0.0	0.0	0.0	0.0	159.9					
01-Jun-16	223.2	224.3	3,135.6	(305.6)	1,803.0	(499.7)	171.1	(101.6)	857.0	(684.8)	1,571.0	(1,571.0)	(2,938.4)					
01-Jun-17	428.6	7.3	4,501.4	(233.3)	19.0	(6.3)	0.0	0.0	0.0	0.0	32.0	(32.0)	(264.3)					
01-Jun-18	2,928.2	236.1	624.4	(44.2)	400.0	(186.2)	0.0	0.0	144.0	(137.0)	681.9	(681.9)	(813.2)					
01-Jun-19	786.5	6.5	1,348.4	(145.0)	492.9	(125.0)	0.0	0.0	142.4	(134.8)	47.7	(47.7)	(446.0)					

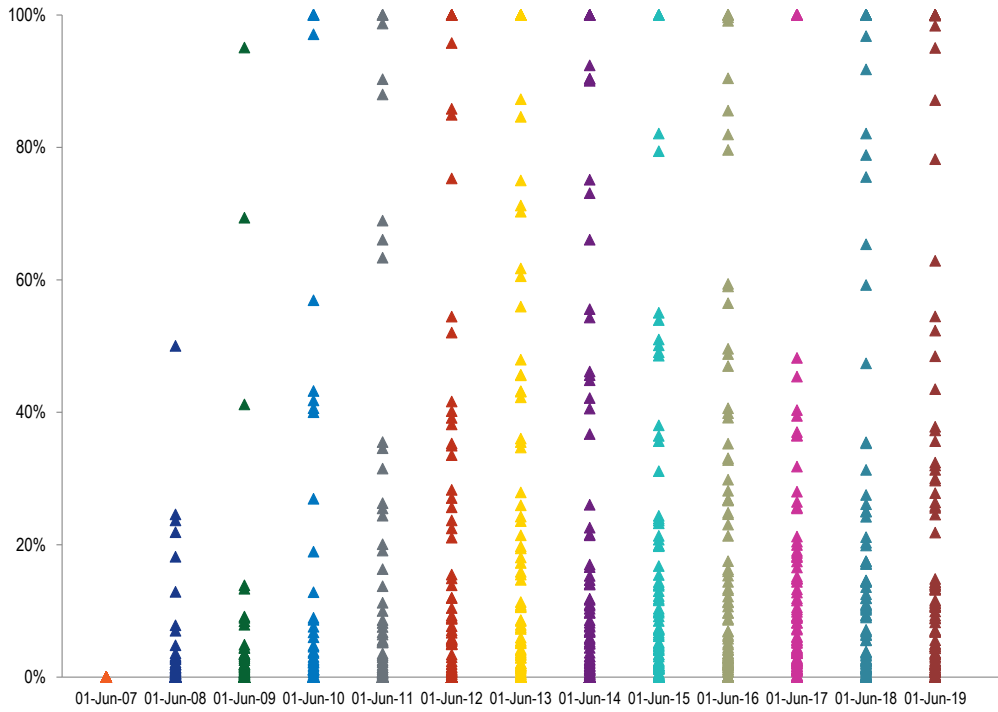
**Table 68 RPM cleared and replacement capacity by replacement percentage at parent company level for demand resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)															Total Net Replacements			
	0 Percent			> 0 Percent and <= 25 Percent			> 25 Percent and <= 50 Percent			> 50 Percent and <= 75 Percent			> 75 Percent and < 100 Percent				100 Percent		
	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net		RPM Cleared	Net Replacements	Net
01-Jun-07	127.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
01-Jun-08	376.5	0.0	182.9	(40.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(40.0)
01-Jun-09	166.7	0.0	268.6	(52.9)	0.0	0.0	0.0	0.0	51.6	(35.8)	406.0	(386.0)	0.0	0.0	0.0	0.0	0.0	0.0	(474.7)
01-Jun-10	42.0	0.0	415.4	(11.5)	0.0	0.0	0.0	0.0	0.0	0.0	23.9	(23.2)	481.6	(481.6)	0.0	0.0	0.0	0.0	(516.3)
01-Jun-11	97.1	12.7	0.0	0.0	873.5	(269.9)	196.4	(135.6)	0.0	0.0	659.6	(659.6)	0.0	0.0	0.0	0.0	0.0	0.0	(1,052.4)
01-Jun-12	1,483.1	54.3	1,986.2	(357.7)	4,711.5	(1,467.5)	0.0	0.0	493.8	(416.4)	66.3	(66.3)	0.0	0.0	0.0	0.0	0.0	0.0	(2,253.6)
01-Jun-13	558.6	175.0	2,859.0	(400.1)	5,659.5	(1,696.6)	632.4	(386.4)	429.0	(365.2)	641.1	(641.1)	0.0	0.0	0.0	0.0	0.0	0.0	(3,314.4)
01-Jun-14	222.3	1.2	2,218.5	(362.9)	9,876.7	(4,017.9)	57.3	(36.1)	1,245.2	(993.1)	1,323.0	(1,323.0)	0.0	0.0	0.0	0.0	0.0	0.0	(6,731.8)
01-Jun-15	459.5	15.1	8,405.6	(1,330.4)	3,228.3	(1,264.1)	2,626.8	(1,526.4)	61.7	(52.1)	671.8	(671.8)	0.0	0.0	0.0	0.0	0.0	0.0	(4,829.7)
01-Jun-16	648.8	0.7	2,722.9	(438.7)	8,330.2	(3,147.6)	619.7	(369.0)	539.2	(441.6)	404.5	(404.5)	0.0	0.0	0.0	0.0	0.0	0.0	(4,800.7)
01-Jun-17	531.9	43.0	3,625.7	(582.8)	6,774.6	(2,517.9)	297.1	(181.7)	48.9	(38.9)	592.5	(592.5)	0.0	0.0	0.0	0.0	0.0	0.0	(3,870.8)
01-Jun-18	308.3	0.0	7,051.1	(1,104.4)	3,428.9	(1,542.4)	223.4	(132.3)	83.3	(62.9)	340.4	(340.4)	0.0	0.0	0.0	0.0	0.0	0.0	(3,182.4)
01-Jun-19	1,214.2	0.0	5,587.6	(648.2)	3,404.9	(1,143.5)	313.5	(166.6)	68.1	(65.7)	114.8	(114.8)	0.0	0.0	0.0	0.0	0.0	0.0	(2,138.8)

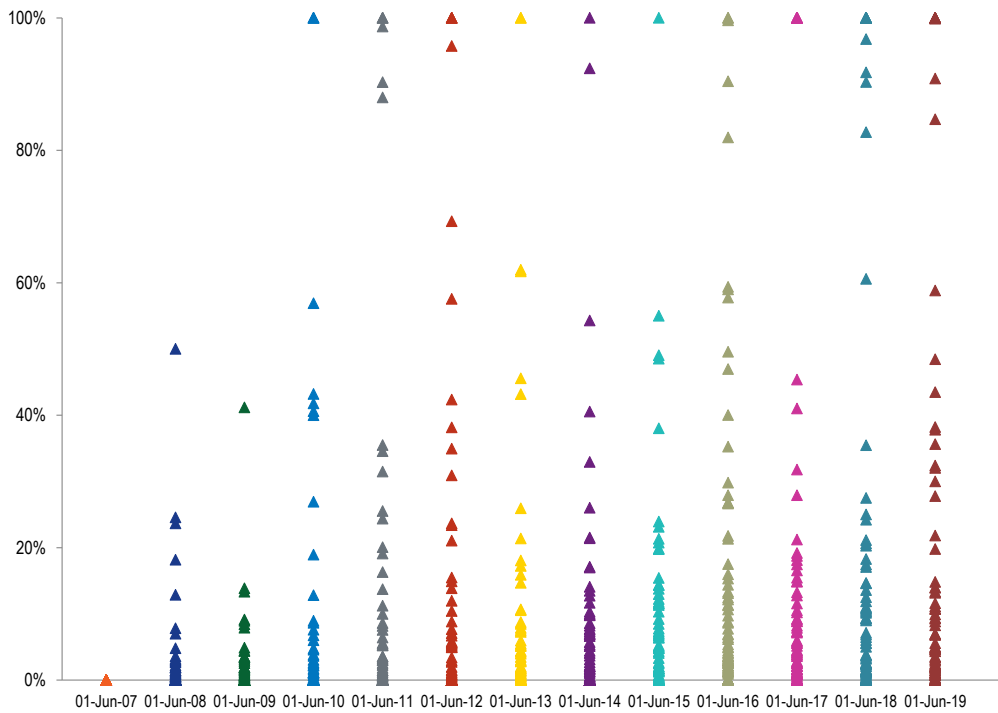
**Table 69 RPM cleared and replacement capacity by replacement percentage at parent company level for energy efficiency resources: June 1, 2007 to June 1, 2019**

	UCAP (MW)															Total Net Replacements				
	0 Percent			> 0 Percent and <= 25 Percent			> 25 Percent and <= 50 Percent			> 50 Percent and <= 75 Percent			> 75 Percent and < 100 Percent				100 Percent			
	UCAP (MW) Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net	RPM Cleared	Net Replacements	Net		RPM Cleared	Net Replacements	Net	
01-Jun-07																				
01-Jun-08																				
01-Jun-09																				
01-Jun-10																				
01-Jun-11	76.4	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
01-Jun-12	594.1	5.2	0.0	0.0	57.7	(28.6)	10.3	(7.5)	0.0	0.0	4.0	(4.0)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(34.9)
01-Jun-13	870.5	143.5	0.0	0.0	16.6	(6.6)	0.0	0.0	14.0	(13.2)	3.1	(3.1)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	120.6
01-Jun-14	1,008.9	261.7	0.0	0.0	0.0	0.0	0.0	0.0	67.3	(55.5)	1.5	(1.5)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	204.7
01-Jun-15	1,189.6	335.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	335.9
01-Jun-16	1,390.2	192.0	31.6	(3.1)	249.3	(80.0)	0.0	0.0	32.9	(28.6)	19.2	(19.2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61.1
01-Jun-17	1,649.0	271.0	224.1	(29.4)	0.0	0.0	9.0	(5.8)	0.0	0.0	40.2	(40.2)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	195.6
01-Jun-18	1,413.4	982.0	134.3	(0.1)	25.7	(10.2)	0.0	0.0	0.0	0.0	722.9	(722.9)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	248.8
01-Jun-19	2,290.8	0.0	188.0	(0.3)	0.0	0.0	0.0	0.0	0.0	0.0	49.7	(49.7)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(50.0)

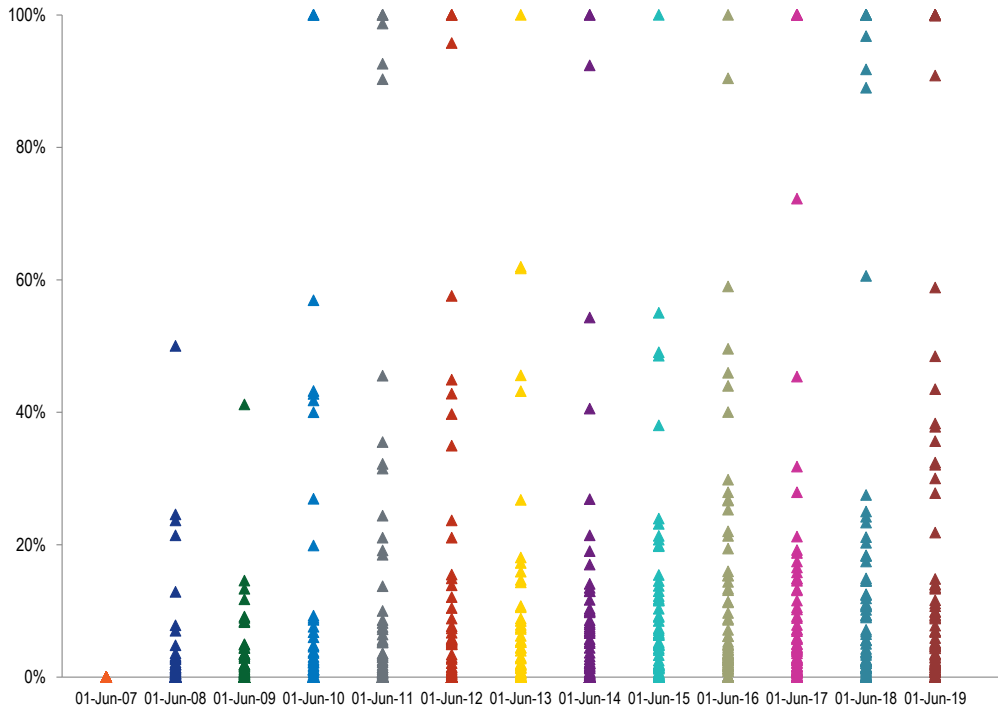
**Figure 1 Company replacement percentages for all capacity resources: June 1, 2007 to June 1, 2019**



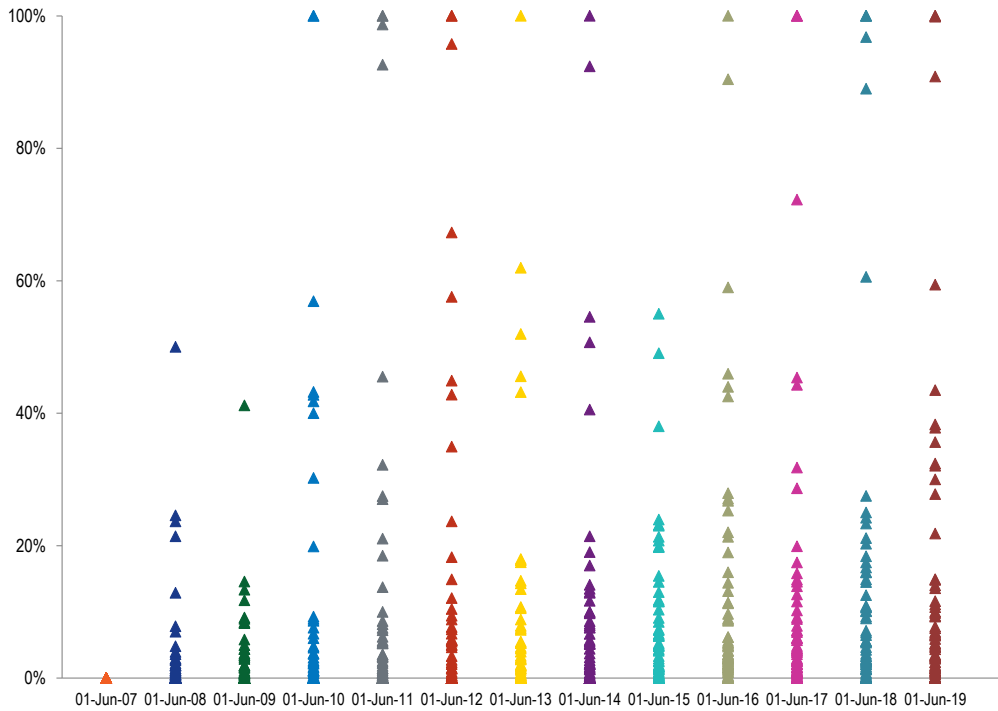
**Figure 2 Company replacement percentages for generation resources: June 1, 2007 to June 1, 2019**



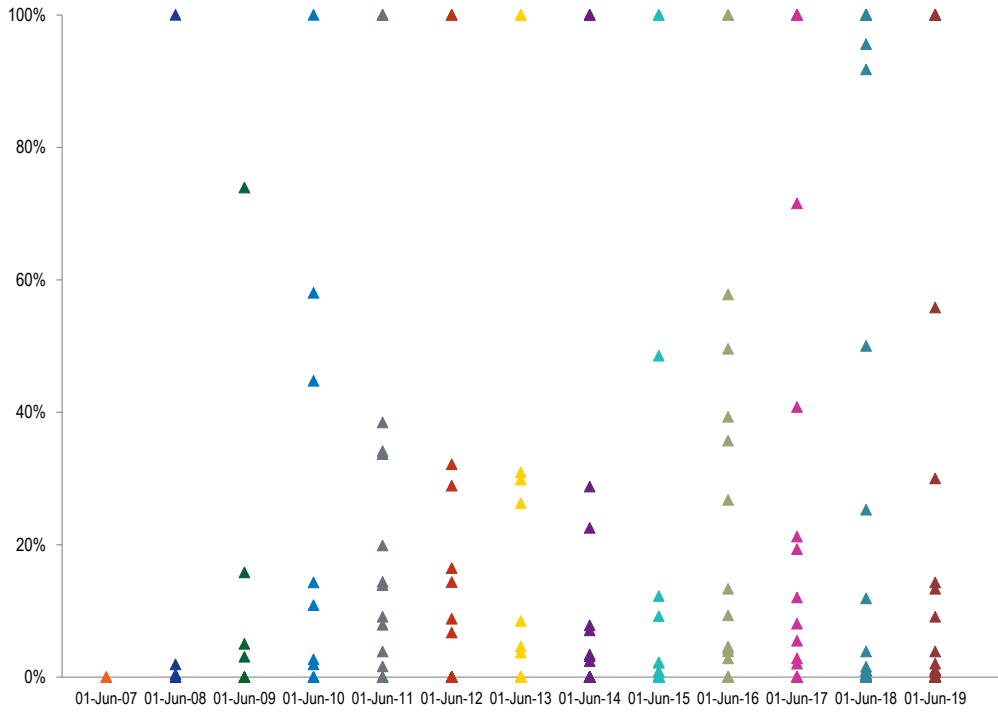
**Figure 3 Company replacement percentages for internal generation resources: June 1, 2007 to June 1, 2019**



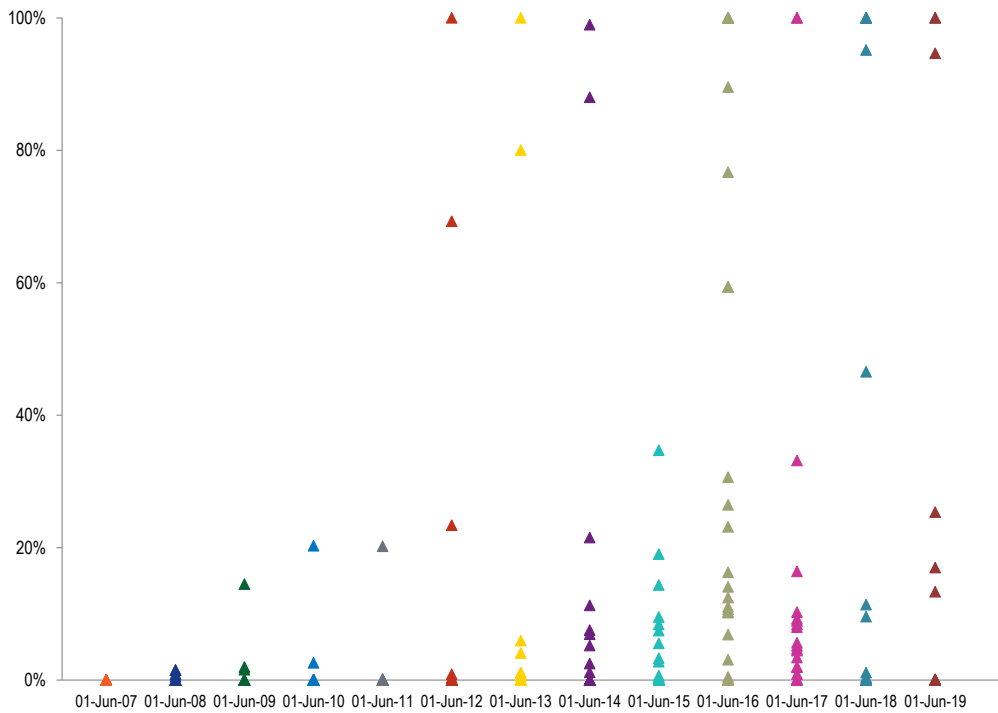
**Figure 4 Company replacement percentages for internal generation resources in service: June 1, 2007 to June 1, 2019**



**Figure 5 Company replacement percentages for internal generation resources not in service: June 1, 2007 to June 1, 2019**

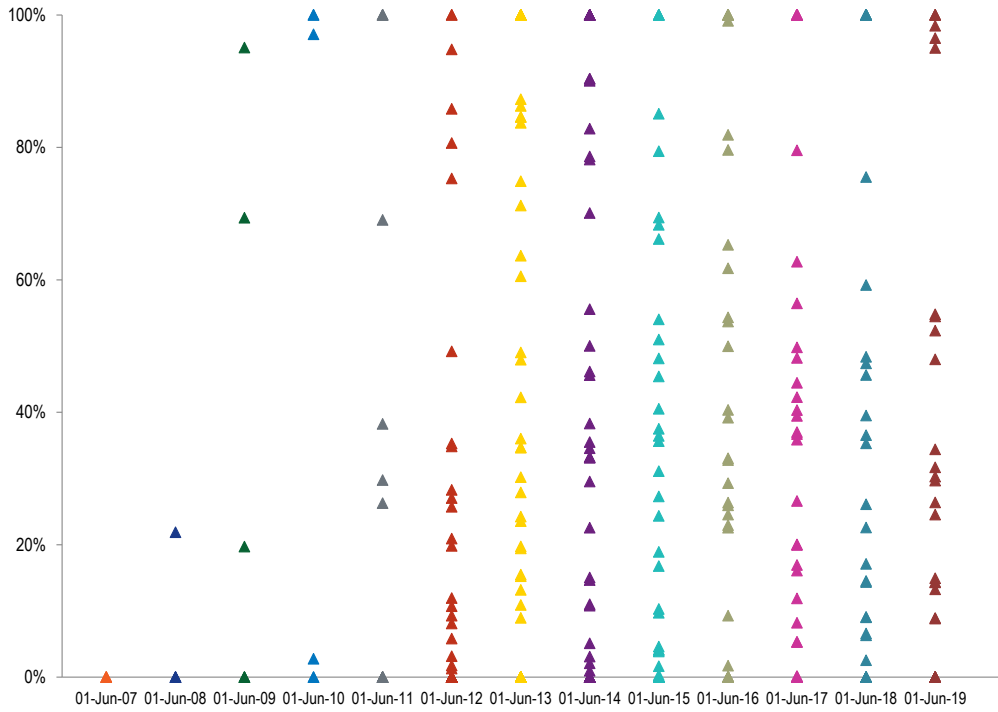


**Figure 6 Company replacement percentages for external generation resources: June 1, 2007 to June 1, 2019**

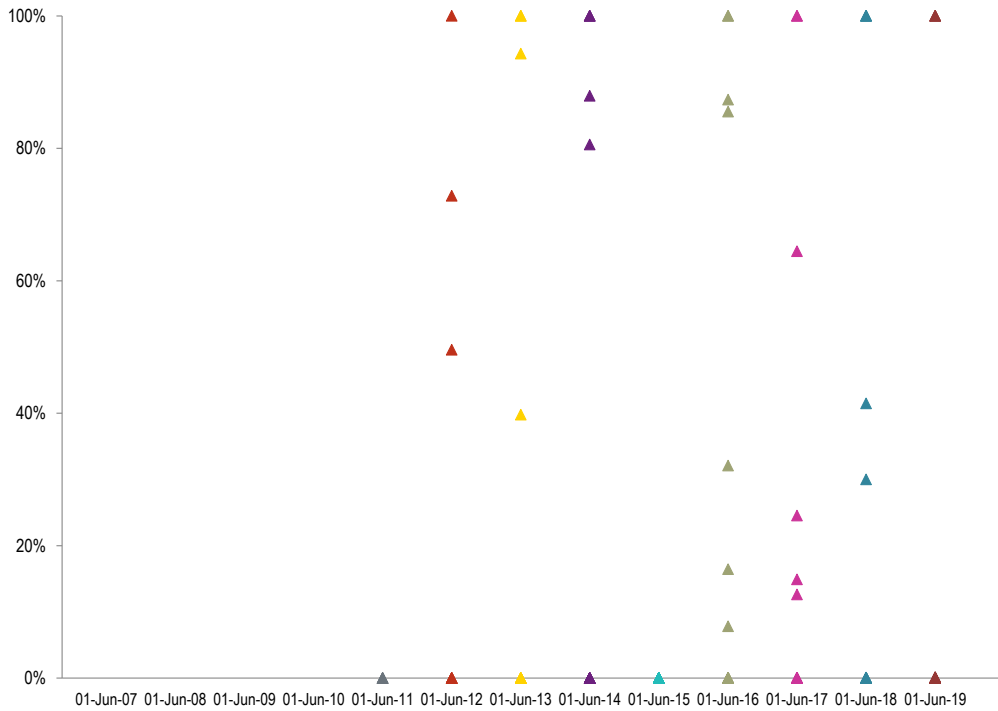




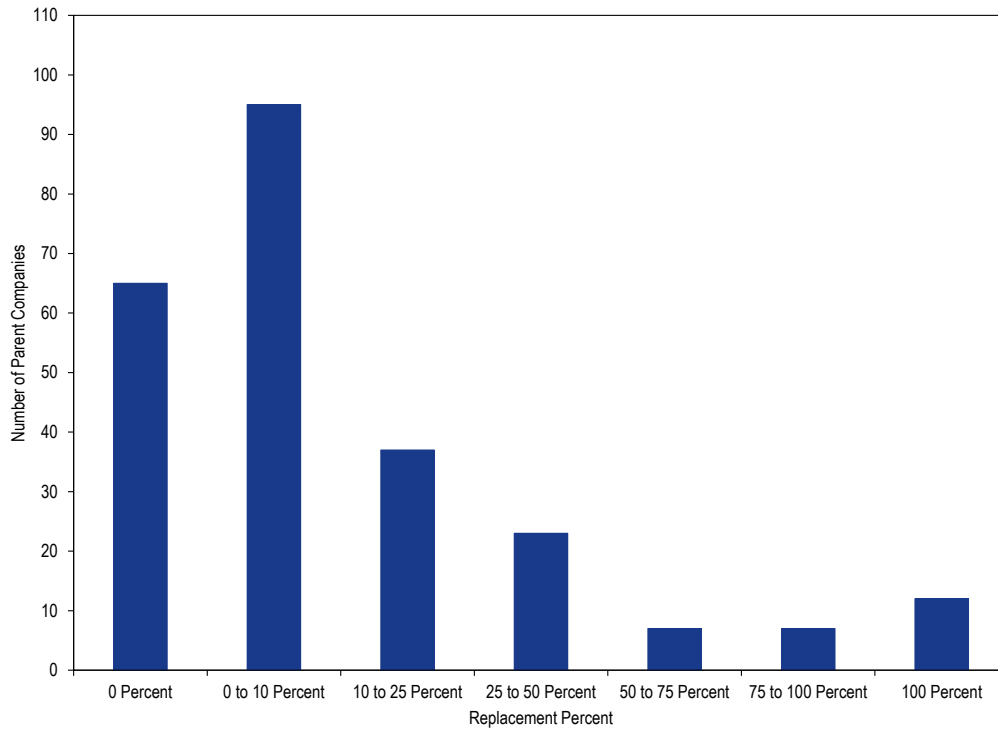
**Figure 7 Company replacement percentages for demand resources: June 1, 2007 to June 1, 2019**



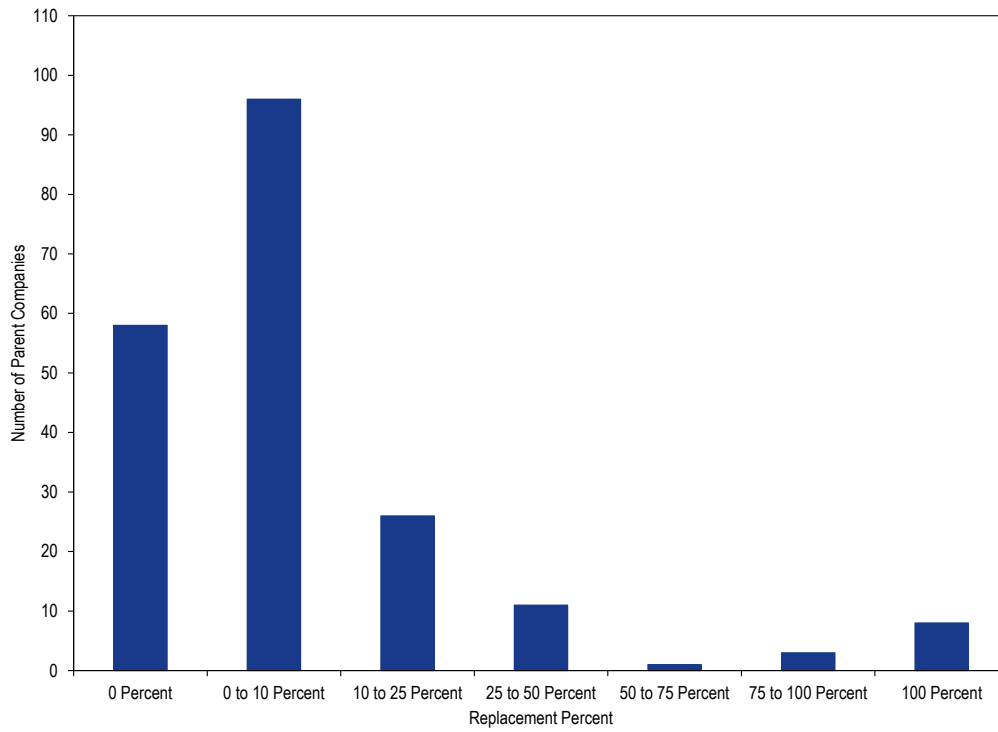
**Figure 8 Company replacement percentages for energy efficiency resources: June 1, 2007 to June 1, 2019**



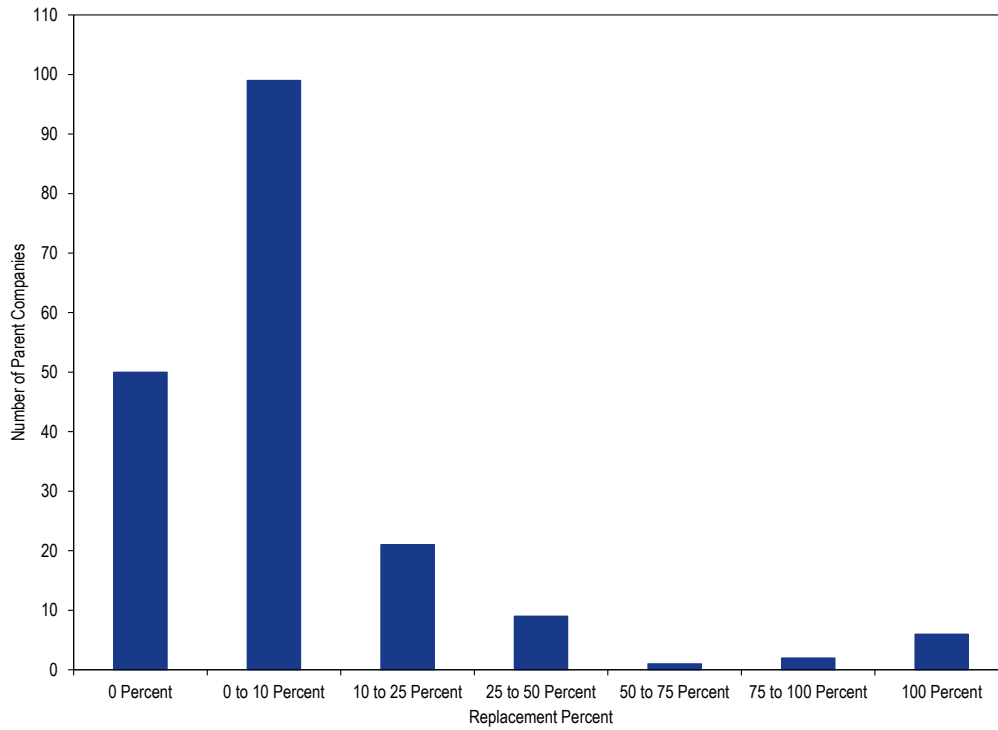
**Figure 9 Number of companies by replacement percent for all capacity resources**



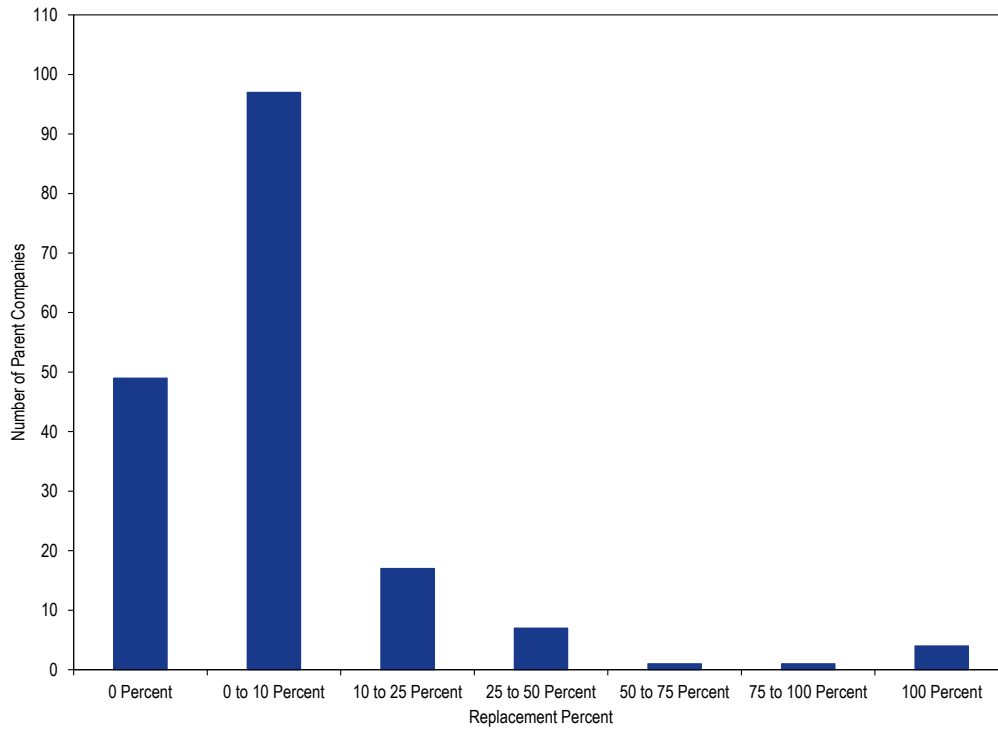
**Figure 10 Number of companies by replacement percent for generation resources**



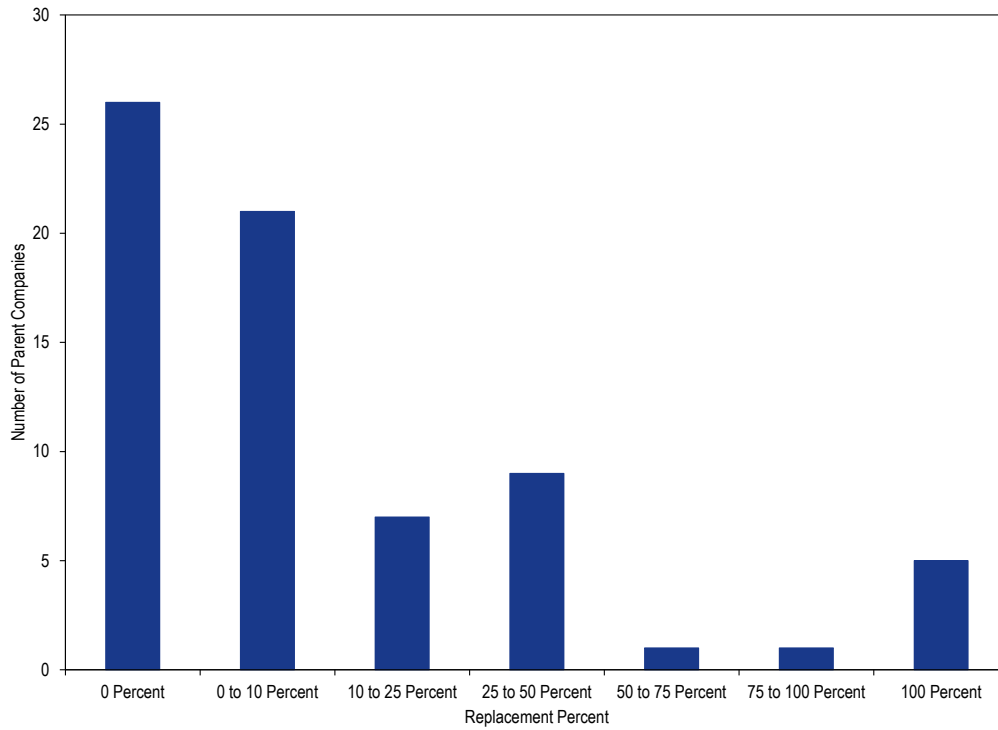
**Figure 11** Number of companies by replacement percent for internal generation resources



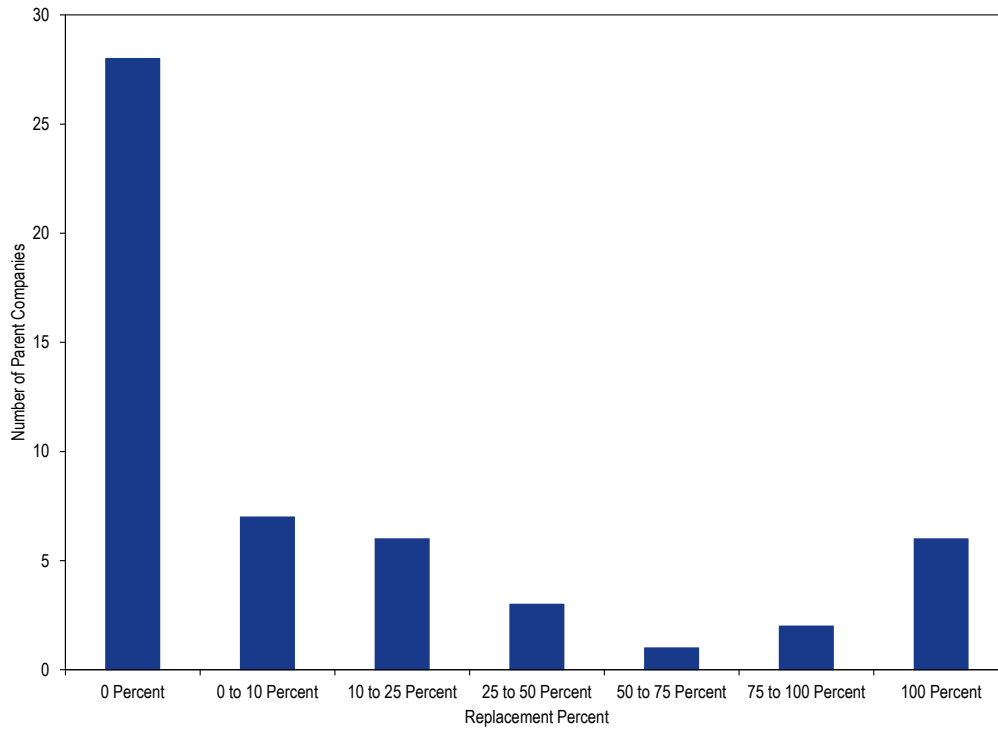
**Figure 12** Number of companies by replacement percent for internal generation resources in service



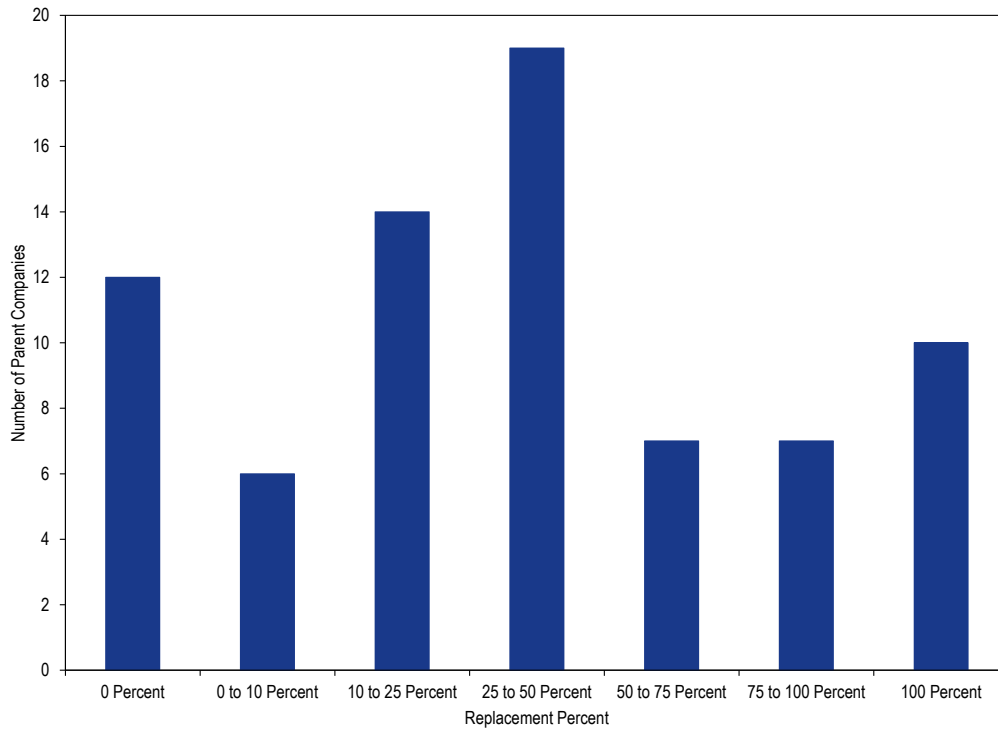
**Figure 13** Number of companies by replacement percent for internal generation resources not in service



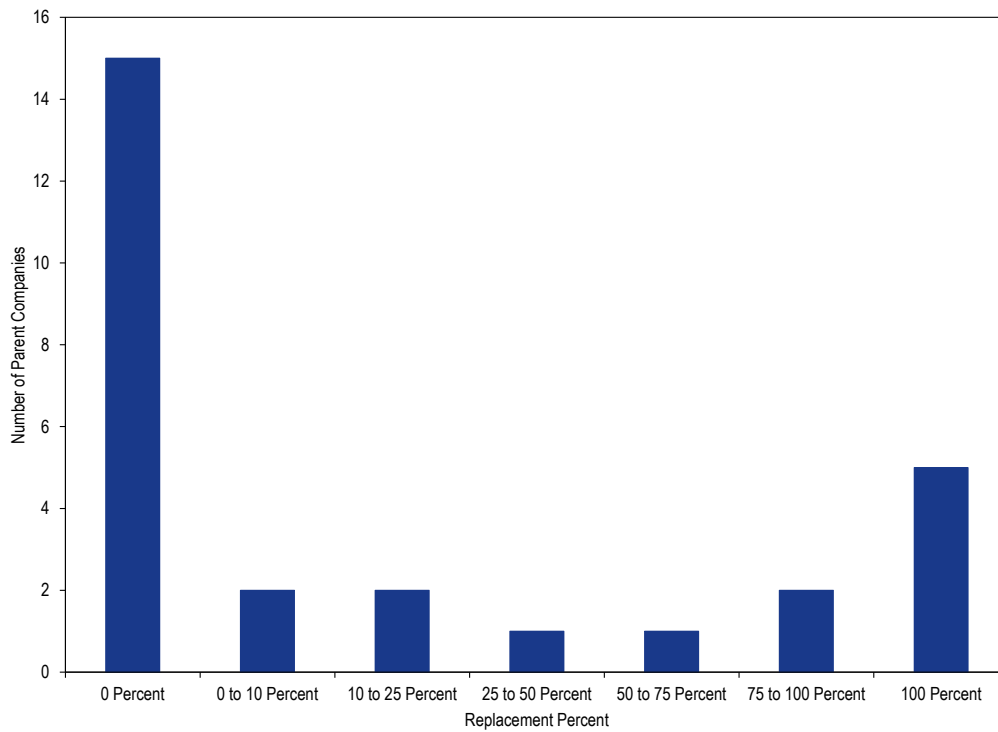
**Figure 14** Number of companies by replacement percent for external generation resources



**Figure 15 Number of companies by replacement percent for demand resources**



**Figure 16 Number of companies by replacement percent for energy efficiency resources**



## Persistence

The Market Monitor’s persistence metric measures the persistence of replacement capacity activity by parent companies. The persistence metric is based, for each company, on the amount of capacity replaced each delivery year and the number of delivery years for which capacity has been replaced. For example, a capacity market seller that replaced 90 percent of its capacity for June 1 of every delivery year for which the capacity market seller sold capacity in RPM has a high level of persistence. At the other extreme, a low level of persistence applies to a capacity market seller that replaced five percent of its capacity for June 1 of four delivery years and zero percent in the remainder of delivery years for which the capacity market seller sold capacity in RPM. The annual replacement score, shown in Table 70, is a number ranging from 0 to 5, determined by a capacity market seller’s replacement percent for each delivery year. The persistence metric is defined as the sum of the capacity market seller’s annual replacement scores, multiplied by an adjustment factor equal to 13 divided by the number of delivery years that the capacity market seller sold capacity in RPM.<sup>62</sup>

**Table 70 Annual replacement score**

Replacement Percent (RP)	Annual Replacement Score
RP = 0%	0
0% < RP ≤ 25%	1
25% < RP ≤ 50%	2
50% < RP ≤ 75%	3
75% < RP ≤ 100%	4
RP = 100%	5

The formula for persistence is as follows:

$$\text{persistence} = \sum_{k=1}^{13} \text{Annual Replacement Score}_k \times \frac{13}{Y}$$

where:

Annual Replacement Score<sub>k</sub> is the annual replacement score for delivery year k based on the capacity market seller’s replacement percentage for delivery year k;

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<sup>62</sup> The numerator of the adjustment factor is set equal to the total number of delivery years since the inception of the RPM. In the case that a capacity market seller has participated in every delivery, starting with the 2007/2008 delivery year, the persistence metric is equal to the sum of the annual replacement scores.

Y is the number of delivery years that a capacity market seller sold capacity in RPM; and

13 is the total number of delivery years since the start of the RPM.

The lowest attainable value for persistence is zero, the result for a capacity market seller that never replaced capacity. The maximum attainable value for persistence is 65, the result for a capacity market seller that replaced 100 percent of its capacity for June 1 in each delivery year the capacity market seller sold capacity in RPM. All other replacement activity will result in a persistence value between zero and 65. Table 71 shows a sample calculation for a capacity market seller that began participation in the 2011/2012 Delivery Year and did not replace capacity for the first two delivery years, replaced five percent of the capacity in the third delivery year, and increased its replacement activity in subsequent delivery years. The sum of the annual replacement scores is 17.0, which is multiplied by the ratio, 13/9, to reflect that the replacement activity has occurred over nine years rather than the full history of the RPM market.

**Table 71 Persistence metric example**

Delivery Year	Replacement Percent	Annual Replacement Score
2007/2008	NA	NA
2008/2009	NA	NA
2009/2010	NA	NA
2010/2011	NA	NA
2011/2012	0.0%	0
2012/2013	0.0%	0
2013/2014	5.0%	1
2014/2015	30.0%	2
2015/2016	30.0%	2
2016/2017	70.0%	3
2017/2018	80.0%	4
2018/2019	100.0%	5
2019/2020	100.0%	5
Sum of Annual Replacement Scores		22.0
Persistence Metric		31.8

Table 72 shows the persistence metric results for the period June 1, 2007, to June 1, 2019. The average persistence value for all capacity resources is 13.1. Internal generation resources in service have the lowest average persistence at 8.8, and demand resources have the highest level with an average persistence of 26.1. Energy efficiency resources have the second highest level with an average persistence of 18.7. A persistence level of 26.1 indicates significant levels of replacement in multiple years. For example, a capacity

market seller with a replacement percentage between 25 percent and 50 percent in every year of RPM participation would have a persistence value of 26.0.

The results of the persistence metric support the conclusion that demand resources and energy efficiency resources engage in persistent replacement activity and the level of replacement activity is significantly higher than the replacement activity for generation resources. External generation resources and internal generation resources not in service have the highest replacement persistence of the generation categories.

**Table 72 Persistence metric for RPM replacement activity: June 1, 2007 to June 1, 2019<sup>63</sup>**

	Number of Market Sellers	Average Persistence	Number of Market Sellers with Persistence = 0	Number of Market Sellers with Persistence = 65	Percent of Market Sellers with Persistence = 0	Percent of Market Sellers with Persistence = 65
All Capacity Resources	246	13.1	59	12	24.0%	4.9%
Generation Resources	203	10.5	51	8	25.1%	3.9%
Internal Generation	188	10.1	42	6	22.3%	3.2%
Internal Generation in Service	176	8.8	42	4	23.9%	2.3%
Internal Generation not in Service	70	14.2	19	5	27.1%	7.1%
External Generation	53	13.6	22	6	41.5%	11.3%
Demand Resources	75	26.1	12	10	16.0%	13.3%
Energy Efficiency Resources	28	18.7	12	5	42.9%	17.9%

Since the persistence metric is based on net replacement percent, the persistence metric does not show the MW level of the replacement activity. For example, two companies with different MW levels of replacement but the same percent level of net replacement will have the same persistence value. A high value for average net replacement MW coupled with a low persistence value indicates that the company has a large portfolio, replaces a significant amount, but the replaced MW are a small percent of the company's total UCAP obligation.

The persistence metric does not distinguish high replacement in a single year of participation from high replacement in multiple years of participation in the capacity market. For example, the persistence metric has the same value for: a company that sold capacity in only one year and replaced all its capacity in that one year; and a company that sold capacity in all eleven years and replaced all its capacity for all of those years. There were 12 companies with an overall persistence value of 65, and seven of these 12 companies had only one year of participation in the capacity market.

Persistence values, excluding companies with one year of participation in a resource classification, are summarized in Table 73. If companies with one year of RPM participation are excluded, the average persistence for all capacity resources would be 12.3 (Table 73), 6.2 percent lower than the 13.1 average persistence value including all companies (Table 72). Capacity market sellers with one year of RPM participation in the

<sup>63</sup> Numbers for all the identified resource classifications are not reported as a result of PJM confidentiality rules.



demand resource category do not have a significant impact on the demand resource category. If companies with one year of RPM participation in the demand resource category are excluded, the average persistence for demand resources would be 25.9, 0.7 percent lower than the average persistence value in Table 72. If companies with one year of RPM participation in the energy efficiency resource category are excluded, the average persistence metric for energy efficiency resources would increase from 18.7 to 20.0. These results further support the conclusion that capacity market sellers with demand resources and energy efficiency resources exhibit more persistent replacement behavior in the capacity market.

**Table 73 Persistence metric for RPM replacement activity, excluding companies with one year of participation in a resource classification<sup>64</sup>**

	Number of Market Sellers	Average Persistence	Number of Market Sellers with Persistence = 0	Number of Market Sellers with Persistence = 65	Percent of Market Sellers with Persistence = 0	Percent of Market Sellers with Persistence = 65
All Capacity Resources	222	12.3	43	5	19.4%	2.3%
Demand Resources	64	25.9	6	6	9.4%	9.4%
Energy Efficiency Resources	23	20.0	8	4	34.8%	17.4%

## Conclusion

Sellers of demand resources in RPM auctions disproportionately replace those commitments on a consistent basis compared to sellers of other resource types. External generation and internal generation not in service had high rates of replacement in some years and those are also of concern.

Effective March 2, 2014, every DR provider must submit a DR Sell Offer Plan, consisting of a completed template document with certain required information and a DR Offer Certification Form, at least 15 business days prior to an RPM auction.<sup>65 66</sup> The DR plan enhancements were meant to standardize the information requirements for offering planned DR, increase the likelihood that offers are based on physical assets and reduce the level of speculative offers. However, the DR plan enhancements did not go far enough to ensure that DR offers are based on physical assets at the time of the offer and therefore did not address the issue of speculative offers that are replaced in incremental auctions.

<sup>64</sup> Numbers for all the identified resource classifications are not reported as a result of PJM confidentiality rules.

<sup>65</sup> 146 FERC ¶ 61,150 (2014).

<sup>66</sup> See PJM Reliability Assurance Agreement among Load-Serving Entities in the PJM Region, Schedule 6. See also definition of Planned Demand Resource in PJM Reliability Assurance Agreement among Load-Serving Entities in the PJM Region, Article 1.

The rules should require that planned DR be a specific, physical resource that is able to provide the identified reduction in the delivery year, and that the entity offering the planned DR must demonstrate how its capability will be provided, prior to the offer whether in a BRA or IA or commitment to an FRR capacity plan. The rules require a specific customer and a specific site only for planned DR which are in zones of concern and which are in excess of a CSP's defined sell offer threshold, but does not require a contract. This conditional requirement has resulted in a limited application of the requirement that all capacity resources be physical resources. For the 2017/2018 through 2022/2023 delivery years, the zones of concern include only ATSI, PENELEC, or MetEd.<sup>67</sup>

The Market Monitor recommends that DR providers be required to have a signed contract with specific customers for specific facilities for specific levels of DR at least six months prior to any capacity auction in which the DR is offered.

Under the current DR rules, DR providers may not have identified customers, may not have clear plans for implementing DR measures and may not receive commitments from new customers until relatively close to the delivery year and well after the RPM BRA is run for that delivery year. This is not consistent with the definition of a capacity resource.

Except for a limited, conditional requirement to provide site specific information in the DR plans, the current DR rules allow DR providers to register sites relatively close to the delivery year. The rules for registering end-use customer sites just before the commencement of the delivery year, however, have created confusion about the nature of DR that may be offered into BRAs. Curtailment Service Providers (CSPs) have routinely offered planned DR in BRAs without having identified the specific customers, evaluated their capabilities at the sites of their operation, evaluated the willingness of the customers to develop such capabilities, or determined that the site was not already committed to another party. This has meant acceptance of DR in Base Residual Auctions that reflects only a CSP's speculation about whether or not it could sign up actual customers. There is no reason to expect that the planned DR offered in a BRA, under the DR rules as currently applied, represents DR expected to be physically available in the delivery year. The evidence shows that DR providers, including CSPs and individual customers, do regularly and persistently purchase replacement capacity for a substantial portion of their BRA commitments for DR at a significant discount to the initial sale price.

The risks to the markets associated with the sale of DR without any supporting information on the plausibility of the underlying assets include the risk that multiple CSPs could be assuming that they will win the same customers and the risk that sellers

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<sup>67</sup> See "Zones of Concern," (November 29, 2018) <<https://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/zones-of-concern.ashx?la=en>>.

are taking speculative positions with a low probability of fulfilling them. The result in both cases is that the system is less reliable than it might otherwise be because the full amount of DR that cleared the RPM auction is not actually available, the price to other capacity resources has been suppressed by the sale of the speculative DR, new entry of other capacity resources could have been forestalled by the sale of speculative DR, and there may not be adequate replacement resources available with short notice prior to the delivery year.

The dynamic that can result is that the speculative DR suppresses prices in the BRA and displaces physical generation assets. Those generation assets then have an incentive to offer at a low price, including offers at zero and below cost, in IAs in order to ensure some capacity market revenue for long lived physical resources which the owners expect to maintain for multiple years. The result is lower IA prices which permit the buyback of the speculative DR at prices below the BRA prices which encourages the greater use of speculative DR.

PJM's sale of capacity in IAs at very low prices, given that PJM announces the MW quantity and the sell offer price in advance of the auctions, further reduces IA prices and increases the incentive of DR sellers to speculate in the BRAs. The Market Monitor recommends that if PJM sells capacity in incremental auctions, PJM should offer the capacity for sale at the BRA clearing price in order to avoid suppressing the IA price below the competitive level. If the PJM sell offer price is not the BRA clearing price, PJM should not reveal its proposed sell offer price or the MW quantity to be sold prior to the auction.

It has been asserted that selling at a high price in the BRA and buying back at a low price in the IA is just a market transaction and therefore does not constitute a problem. But permitting DR to be an option in the BRA rather than requiring DR to be a commitment to provide a physical asset gives DR an unfair advantage and creates a self fulfilling dynamic that incents more of the same behavior. Only DR is permitted to be an option in the BRA. Generation resources must have met physical milestones in order to offer in the BRA. It is not reasonable to permit DR capacity resources to have a different product definition than generation capacity resources. Even if DR is treated as an annual product, this unique treatment as an option makes DR an inferior resource and not a complete substitute for generation resources. The current approach to DR is also inconsistent with the history of the definition of capacity in PJM, which has always been that capacity is physical and unit specific. The current approach to DR effectively makes DR a virtual participant in the PJM Capacity Market. That option should be eliminated.

DR should be treated like any other capacity resource and be required to provide annual service and be required to make offers in capacity auctions based on verifiable evidence of a physical commitment from specific and identified customers. The requirement to make annual offers was addressed in PJM's Capacity Performance rules for RPM. However, the implementation of the seasonal capacity rules continues to allow summer period DR, either if capacity market sellers commercially aggregate with winter period

capacity, or offer standalone and allow the auction clearing optimization to match and clear equal quantities of summer and winter resources. That the DR business model may have relied on speculative offers is no reason to continue that practice. The practice has had demonstrable negative impacts on capacity markets. If DR aggregators cannot get commitments three years ahead for new customers, they should get such commitments in the year of the delivery year for Third IAs. Once customers are established and understand the market and the associated risks and benefits, they can be offered into BRAs, consistent with the tariff rules.

The requirement to be a physical resource should be applied to all resource types, including planned generation and imports. The same logic applies to all resource types, and the rules should be applied to all resource types in order to ensure an effective and efficient capacity market in PJM.

The rules governing replacement transactions in the capacity market must be strengthened and clarified to remove the incentive to enter speculative transactions. The rules governing replacement transactions include some restrictions on transactions occurring prior to the Third IA for the relevant delivery year but include no restrictions on transactions occurring after the Third IA and before the start of the delivery year. Replacement transactions are also permitted retroactively after a performance assessment interval (PAI).

The Market Monitor recommends that, in addition to the other recommendations, replacement capacity transactions be permitted only for resources that have physical reasons that require them to be replaced. Such reasons include: generator deactivation; generator derating; cancellation or delay of a generation project; permanent departure of specific customers' load used as basis for DR offer or EE offer. Any capacity resources that are replaced may not be later used to fulfill any capacity obligation for the delivery year.

The Market Monitor recommends that retroactive replacement transactions associated with a failure to perform during a PAH/PAI not be allowed and that, more generally, retroactive replacement capacity transactions not be permitted. Such replacement transactions undermine the fundamental incentives of the capacity performance construct. If a unit has a commitment to perform and the unit fails to perform when PJM calls on that unit during a very high load hour, the unit should pay the performance penalty. Allowing an after the fact substitution by another unit is merely a pretense designed for the sole purpose of avoiding capacity performance penalties. The system operators relied on the identified unit for performance. If it did not perform, it should pay the penalty. There are no excuses. Allowing a retroactive substitution of another unit is the ultimate excuse. It is equivalent to pretending it never happened. If the

substitute unit was available during the PAH/PAI and it performed, it would receive bonus payments funded by penalty payments as an incentive for it to perform.

PJM made a filing on March 10, 2014, to propose tariff changes to address aspects of the replacement capacity issue including the physical nature of capacity commitments.<sup>68</sup> On May 9, 2014, the Commission rejected PJM's filing and instituted a 206 proceeding in Docket No. EL14-48-000 and a corresponding technical conference.<sup>69</sup> On August 18, 2014, PJM asked that the Commission defer action in that proceeding.<sup>70</sup>

On October 29, 2015, PJM filed a letter with the Commission asserting that the deferral should continue because additional data were needed to determine if the previously identified speculative behavior was continuing under the capacity performance construct.<sup>71</sup> PJM stated that it would not have the required data until after at least one incremental auction under the CP construct.<sup>72</sup> The results of that auction were posted on September 23, 2016. On November 23, 2016, PJM filed another letter with the Commission requesting further deferral until more data is collected and a new PJM stakeholder process address changes to the structure of incremental auctions.<sup>73</sup> In the November 23, 2016, letter PJM committed to filing another replacement capacity report with FERC by October 30, 2017. On March 9, 2018, PJM asked that the Commission defer action in the replacement capacity proceeding while the Commission considered PJM's proposed IA tariff revisions which were filed concurrently with the deferral request.<sup>74</sup> <sup>75</sup> On May 8, 2018, FERC rejected the proposed IA tariff revisions and terminated the 206 proceeding in Docket No. EL14-48-000.<sup>76</sup> PJM never filed an updated report with FERC in the replacement capacity proceeding.

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<sup>68</sup> PJM, Revisions to the PJM Open Access Transmission Tariff and Reliability Assurance Agreement Among Load Serving Entities in the PJM Region to Limit and Protect Against Speculative Offers Submitted in RPM auctions, Docket No. ER14-1461-000 (March 10, 2014).

<sup>69</sup> *PJM Interconnection, L.L.C.*, 147 FERC ¶ 61,108 (2014).

<sup>70</sup> PJM, Letter Filing, Docket No. ER14-1461-000 et al. (Aug. 18, 2014).

<sup>71</sup> PJM, Letter Filing, Docket No. ER14-1461-000 et al. (Oct. 29, 2015).

<sup>72</sup> *Id.* at 2–3.

<sup>73</sup> PJM, Further Report of PJM Interconnection, L.L.C. in the Replacement Capacity Proceeding, Docket Nos. ER14-1461-000 et al. (November 23, 2016) (“November 23<sup>rd</sup> Report”).

<sup>74</sup> PJM, Letter Filing, Docket No. ER14-1461-000 et al. (March 9, 2018).

<sup>75</sup> Docket No. ER18-988-000 (March 9, 2018)

<sup>76</sup> *PJM Interconnection, L.L.C.*, 163 FERC ¶ 61,101 (2018).

There is no reason for further delay on this matter. The evidence has been and continues to be quite clear. The incentives have been and continue to be quite clear. The lack of an enforced specific requirement that all capacity resources be demonstrably specific physical assets when offered into PJM capacity auctions continues to provide strong incentives to offer speculative paper capacity. The pattern of IA prices being substantially lower than BRA prices, exacerbated by PJM's preannounced sales of capacity at low prices in IAs, continues. The pattern of consistently very high levels of replacement by DR providers and EE providers and the relatively high levels of replacement by capacity imports continues.