

November 30, 2012

Honorable Kimberly D. Bose  
Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E., Room 1A  
Washington, D.C. 20426

Re: *PJM Interconnection, L.L.C.*, Docket No. ER13-486-000

Dear Ms. Bose:

PJM Interconnection, L.L.C. (“PJM”), pursuant to section 205 of the Federal Power Act (“FPA”), 16 U.S.C. § 824d, hereby submits revisions to the PJM Open Access Transmission Tariff (“Tariff”) to establish an additional test to identify the commitment level of the PJM demand resource capacity product with the most limits on its availability (known as “Limited DR”) at which the Reliability Pricing Model (“RPM”) capacity auction process will seek greater commitments of other capacity resources, including other types of demand resources, that have fewer limits on their availability. PJM proposes this added test in the method for determining the target level of Limited DR (known as the Limited DR Reliability Target) to better measure the risks of the duration limits on the required response by Limited DR providers. This filing supports the PJM Region’s continued reliance on Limited DR as a capacity resource, while enhancing PJM’s ability to identify at what point it might be over-relying on a product with express limitation on when, and how often, it must respond to PJM’s dispatch.

In this transmittal letter, PJM:

- Reviews how PJM arrived at its current effective market rules that allow for three different demand resource capacity products; that identify when there is a need for greater commitment of resources that have fewer limits on their required response (including the two current tests for identifying acceptable levels of Limited DR commitment); and that reward less-limited resources with higher prices when they are needed;
- Describes how PJM identified the need for a third test to determine the Limited DR Reliability Target;
- Describes that third test and how it is incorporated in the enclosed Tariff revisions;
- Shows that, had this added test been in place in PJM’s last RPM Base Residual Auction (“BRA”), it would have had minimal market impact; and

- Discusses some concerns raised in the stakeholder process for these Tariff changes, and how PJM responds to those concerns.

PJM is due to post the Limited DR Reliability Target on February 1, 2013 for use in RPM's next BRA, which is scheduled for May 2013. As the enclosed Tariff revisions will affect the calculation of the Limited DR Reliability Target, the enclosed revisions reflect an effective date of January 31, 2013. PJM asks that the Commission accept these changes effective upon that date, and issue its final order on these changes before that date, to provide certainty to PJM and market participants preparing for that RPM auction.

## I. BACKGROUND

### A. PJM's December 2010 Demand Resource Product Reform Filing.

The RPM market rules currently allow three demand response products: Limited Demand Resource, or "Limited DR;" Extended Summer Demand Resource, or "Extended Summer DR;" and Annual Demand Resource, or "Annual DR." As its name implies, Limited DR has the most limits on when and how often demand response providers are obligated to provide load reductions. Specifically, Limited DR: (1) is required to respond to PJM calls for load reductions no more than ten times during each summer period of June through September; and (2) is required to provide a load reduction for no longer than six hours each time it is called.<sup>1</sup> By contrast, Annual DR is required to respond on any day of the year for an unlimited number of interruptions each year for up to 10 hours each event,<sup>2</sup> and Extended Summer DR is required to respond for an unlimited number of interruptions each year for up to 10 hours each event, but only during an extended summer period of May through October.<sup>3</sup>

PJM proposed to establish the Annual DR and Extended Summer DR products and to restyle its existing, lone demand resource product as Limited DR on December 2, 2010, in Docket No. ER11-2288.<sup>4</sup> As explained in the December 2010 Filing, PJM found that it needed these additional demand resource products to respond to the tremendous growth in the level of demand resources committed as capacity resources through PJM's annual forward capacity auctions under RPM. PJM proposed Annual DR and Extended

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<sup>1</sup> Reliability Assurance Agreement Among Load Serving Entities in the PJM Region, Rate Schedule FERC No. 44 ("RAA"), Art. I, § 1.43A. Limited DR also only is required to respond between noon and 8:00 p.m. during its June to September availability period.

<sup>2</sup> RAA, Art. I § 1.1A.

<sup>3</sup> *Id.*, Art. I § 1.20C.

<sup>4</sup> FPA Section 205 Tariff Change Filing of PJM Interconnection, L.L.C., Docket No. ER11-2288-000 (Dec. 2, 2010) ("December 2010 Filing").

Summer DR as product alternatives for demand resources seeking to participate in PJM's capacity market.

As PJM explained in the December 2010 Filing, the considerable limits on the required response of Limited DR were beginning to give rise to reliability concerns as Limited DR was becoming a rapidly increasing share of the capacity resources on which the PJM Region relies. As more megawatts of Limited DR that are available only 10 times per summer and for only six hours per event are committed, then fewer megawatts of more broadly available resources are committed. This increases the risk that PJM may have to call on Limited DR when it is not obligated to respond (e.g., for an 11<sup>th</sup> time, or a 7<sup>th</sup> hour), and with no other, less restricted resources available because fewer of those resources were committed in the capacity auction. PJM explained that as the proportion of PJM-committed capacity that is Limited DR increases, the risk that PJM may need to call on Limited DR (because all other, less limited capacity options are fully utilized) at a time when Limited DR is not required to respond, also increases. PJM therefore proposed in the December 2010 Filing to set a level of Limited DR commitment in the RPM capacity auctions (i.e., the Limited DR Reliability Target) that would trigger the payment of higher prices to less-limited resources,<sup>5</sup> as an incentive to induce commitment of Extended Summer DR or Annual Resources (including Annual DR) and reduce PJM's relative reliance on Limited DR.

To provide flexibility for market participants, PJM also proposed to allow demand response providers to submit "linked" offers for any demand resource that is capable of qualifying as two or more resource types, e.g., as Limited DR or as Extended Summer DR. Under this arrangement, a resource would clear as Extended Summer DR if there is a price premium for that product, or as Limited DR if there is no price premium in effect.

The December 2010 Filing proposed to use two tests to determine the reliability target—one to assess the ten-interruptions limit, and one to assess the six-hour duration

To test the ten-interruptions limit, PJM proposed to compare possible loads on peak days under a range of weather conditions against the generation capacity on such days under a range of conditions and, by varying the assumed amounts of demand

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<sup>5</sup> More precisely, PJM proposed to reduce the total level of capacity needed by the market (known as the Reliability Requirement) by the amount of the Limited DR Reliability Target, in order to determine the minimum quantity of less-limited resources that should be committed in order to ensure reliability. In PJM's auction-clearing algorithm, failure to clear those minimum levels will trigger payment of higher prices to the less-limited resources, in order to attract additional needed commitments of those resources. As PJM explained in the December 2010 Filing, this process is analogous to the locational premium that RPM pays when the auction has failed to clear enough capacity located inside a capacity-constrained area.

resources that are committed and displace committed generation resources, determine the level of Limited DR (as a percentage of peak load) at which there is a 90 percent probability that PJM will not have to call Limited DR to perform more than ten times over one summer period.<sup>6</sup> In support of the 90% probability standard, PJM explained that it had long used ‘90/10’ load forecasts, i.e., “a forecast that has a 10% chance of being exceeded in any year, to design the transmission system;” and that a “90% confidence interval is widely used in statistical studies and commonly recognized as a reasonable standard to apply when interpreting the results of probabilistic studies.”<sup>7</sup>

For the second test, PJM proposed to determine the level of Limited DR at which it could be reasonably confident that it will not need to call on those resources outside their six-hour window. As PJM explained, Demand Resources are intended, and expected, to reduce the daily peak load by the amount of DR dispatched. In some cases, however, six hours of demand reduction might not be enough to reduce the daily peak by the full amount of the demand response. Instead, a new daily peak could be created just outside the six-hour window, at a level that is greater than the original expected daily peak minus the applied demand response. PJM illustrated this concern in the December 2010 Filing using a graph,<sup>8</sup> which is reproduced as Attachment A to this transmittal letter. As can be seen, the daily peak absent demand response on this day would have been approximately 146,000 MW in the hour ending 1700, but approximately 13,000 MW of demand response is deployed, reducing loads at that hour to approximately 133,000 MW. However, due to the availability limit, the demand resources are deployed for only six hours, from the hour ending 1400 through the hour ending 1900, and this is insufficient to keep the daily peak at or below 133,000 MW all day. Instead, there is a new peak of approximately 139,000 MW in the hour ending 1300—outside the six-hour window.

As PJM explained in the December 2010 Filing, shifting the daily peak to an hour outside the six-hour interruption window would result in a peak load that is inconsistent with the peak load used in PJM’s planning studies, which assume that the unrestricted PJM peak is reduced by the *full* amount of dispatched Demand Resources.<sup>9</sup> PJM also explained that the likelihood of shifting the daily peak increases as demand resource penetration increases and “PJM planning studies would, therefore, be understating the actual load on a peak day, which could conceal reliability violations and therefore result in an unreliable system.”<sup>10</sup>

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<sup>6</sup> See Tariff, Att. DD § 2.36B.

<sup>7</sup> Answer of PJM Interconnection, L.L.C., Docket No. ER11-2288-000, at 24 (Jan. 7, 2011).

<sup>8</sup> *Id.* at 14.

<sup>9</sup> December 2010 Filing at 15; *id.* at Attachment A, Affidavit of Thomas A. Falin ¶ 7.

<sup>10</sup> *Id.* at 15.

PJM therefore proposed to test for the six-hour requirement by calculating the megawatt difference between the highest hourly peak load (without netting any responsive load reductions) and the seventh highest hourly peak load (also without netting any responsive load reductions) on high load summer days, dividing those loads by the forecasted peak, and averaging the outcome. This test allows PJM to be reasonably confident that Limited DR will not shift the peak to an hour outside the six-hour window. This is because it prevents PJM from calling more Limited DR than the average difference between the highest and seventh highest hourly peak loads, which would reduce loads in the six-hour window *below* the level of loads outside that window, thus creating a new peak outside the six-hour window.<sup>11</sup>

Because the two tests assess two independent limits on Limited DR's required response, PJM proposed to set the Limited DR Reliability Target as the lower result of these two tests.

B. The Commission's January 2011 Order Accepting PJM's Revised Demand Resource Rules.

On January 31, 2011, the Commission largely accepted the demand resource reforms in the December 2010 Filing, including the Limited DR Reliability Target.<sup>12</sup> The Commission noted that the addition of two new demand resource products "will add flexibility to PJM's ability to procure adequate capacity in the RPM auctions and enhance PJM's emergency dispatch options;"<sup>13</sup> and observed that the new rules "will ensure that enough capacity is committed to meet the area's needs, and also send a price signal to encourage the development of less-limited resources."<sup>14</sup> Although the Commission expressly approved PJM's proposed tests for determining the Limited DR Reliability Target, it required PJM to place those tests in the Tariff, rather than stating them only in the PJM manuals, as PJM had proposed.<sup>15</sup> The Commission specifically approved PJM's use of a 90 percent confidence interval for the ten-interruption test of the Limited DR Reliability Target, finding that "PJM's DR Target calculation methodology is consistent

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<sup>11</sup> *Id.* at 16.

<sup>12</sup> *PJM Interconnection, L.L.C.*, 134 FERC ¶ 61,066 ("January 2011 Order"), *order on compliance filing and rehearing*, 135 FERC ¶ 61,102 (2011).

<sup>13</sup> January 2011 Order at P 27.

<sup>14</sup> *Id.* at P 41.

<sup>15</sup> *Id.* at P 69. The Commission also accepted PJM's proposal to allow "linked" DR offers, noting that "if the system does not need the less-limited product, the auction will clear the demand resource capability at the lower price, and consumers will pay no more than is needed to satisfy reliability." *Id.* at P 51.

with PJM's prior use of 90 percent confidence intervals in determining the amount of capacity it must procure."<sup>16</sup>

C. PJM's Experience Operating Under the Revised Demand Resource Rules.

PJM has now conducted two RPM BRAs with the expanded roster of demand resource products, and the market rules have operated as intended. In the first BRA (held in May 2011), offered demand resources increased by 20% (measured by megawatts of unforced capacity) over those offered in the May 2010 BRA, and cleared demand resources increased by roughly 50%.<sup>17</sup> The vast majority—63%—of the demand resources offered in that auction submitted linked offers as more than one DR product, and the overwhelming majority of those linked offers—over 94%—were qualified and offered as all three product types.<sup>18</sup>

These trends continued in the second BRA conducted under these rules (held in May 2012). Offered demand resources increased by 28% on top of the prior year's 20% increase.<sup>19</sup> Cleared demand resource megawatts also increased—by 5%—on top of the prior year's 50% increase.<sup>20</sup> Again, a large majority of the demand resource offers—57%—were for resources qualifying and offering as more than one DR product type, and most of those linked offers again were for resources that qualified and offered as all three products.<sup>21</sup>

In both BRAs, demand resource product types price-separated to some extent in one or more areas, i.e., the market recognized and rewarded the value of demand resource products with fewer limits on their obligation to respond to PJM's requests for load reductions.

D. Evaluation of Limited DR Reliability Target.

While it has continued to gain experience with the expanded demand resource product offerings, PJM, its expert planning staff, and its stakeholders also have

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<sup>16</sup> *Id.* at P 74.

<sup>17</sup> See PJM Interconnection, L.L.C., 2014-15 Base Residual Auction Report, 6, Table 2A (May 13, 2011), <http://www.pjm.com/~media/markets-ops/rpm/rpm-auction-info/20110513-2014-15-base-residual-auction-report.ashx>.

<sup>18</sup> See *id.* at 7, Table 2B.

<sup>19</sup> See PJM Interconnection, L.L.C., 2015-16 Base Residual Auction Report, 8, Table 3A (May 18, 2012), <http://www.pjm.com/~media/markets-ops/rpm/rpm-auction-info/20120518-2015-16-base-residual-auction-report.ashx>.

<sup>20</sup> See *id.*

<sup>21</sup> See *id.* at 9, Table 3B.

continuously evaluated the demand resource market rules. Among other things, PJM has reviewed the Limited DR Reliability Target rules to ensure that they accurately capture the risks to the PJM Region of possible over-reliance on Limited DR. Specifically, PJM's planning staff assessed whether the current test of the six-hour duration limit for Limited DR adequately captures all significant risks of reliance on a product that is only required to respond for a maximum of six hours during a load reduction event.

As explained above, the ten-interruption test directly measures the Limited DR commitment level at which there is a 90% chance that PJM will not need to call on Limited DR more than 10 times in one summer (June to September) period. By contrast, the duration test assesses whether a call for Limited DR will not be fully effective if the Limited DR only responds for six hours, because part of the daily peak (that otherwise would be reduced by the full amount of the dispatched load reduction) is instead only "pushed" outside the six-hour window. The current duration test does not determine the Limited DR commitment level at which there is an unacceptable risk that PJM will need to call on Limited DR for seven or more hours during a load reduction event. There could, however, be Limited DR commitment levels at which PJM might need to call on Limited DR for a seventh hour, even though Limited DR was generally effective at reducing peak loads (i.e., demand response reduced the peak rather than shifting it) during the first six hours that it was called. Put more simply, shifting the peak outside six hours, versus needing to call Limited DR for a seventh hour, are two distinct risks of the duration limit, but the current test only measures the former, not the latter.

PJM did not propose in the December 2010 Filing a test to measure directly the probability of needing to call on Limited DR for a seventh hour in part because PJM was not confident at that time that it had the technical capability to assess that risk accurately. At that time, the modeling tool with which PJM was most familiar (called PRISM) used a *daily* loss of load expectation ("LOLE") model and therefore could not evaluate the *hourly* duration of emergency actions, like Limited DR. However, since the December 2010 Filing, PJM has gained greater familiarity with the General Electric MARS ("GE-MARS") modeling tool that uses an hourly load model. This *hourly* load model is well-suited to helping PJM estimate the frequency and duration of implementing emergency procedures, including dispatch of Limited DR.

Leveraging this new capability, PJM's planning staff developed a method to test the need for possible reliance on Limited DR for more than 6 hours, and presented its findings and recommendations in the PJM stakeholder process, as discussed below.

#### E. Stakeholder Process.

PJM and its stakeholders developed the reforms to the Limited DR Reliability Target methodology through the PJM stakeholder process commencing in May 2012 in PJM's Planning Committee. As the stakeholder process unfolded throughout 2012, the new methodology was discussed at the PJM Planning Committee and the PJM Markets and Reliability Committee.

At the May 10, 2012 PJM Planning Committee meeting, PJM and stakeholders discussed PJM's recently obtained familiarity with the GE-MARS modeling tool allowing PJM to perform hourly-based analysis and, for the first time, to assess the probability of needing Limited DR for more than six hours. PJM's Markets and Reliability Committee, at the request of the PJM Planning Committee, discussed the new test at its June 28, 2012 meeting and recommended that the PJM Planning Committee work further on the issue.

With this guidance in hand, the PJM Planning Committee discussed the new methodology at its meetings in July, August, and September. At each meeting, PJM provided further background information on the methodology and more detailed results, as requested by stakeholders. At its October 11, 2012 meeting the PJM Planning Committee endorsed the methodology proposed in this filing and advanced it to the PJM Markets and Reliability Committee.

At its October 25, 2012 meeting, the PJM Markets and Reliability Committee voted on the proposal, with 56% of the stakeholders (on a sector-weighted basis) favoring the proposal.<sup>22</sup> That support level falls short, however, of the 67% favorable vote required for formal endorsement. Although not endorsed by a super-majority of the stakeholders, PJM has authority to file changes to its Tariff under FPA section 205, and the PJM Board of Managers has authorized PJM to submit this filing.

## **II. ENCLOSED TARIFF REVISIONS**

As the current procedures do not measure the probability of needing Limited DR for a seventh hour during a single event, they do not assess all risks associated with the duration limit on Limited DR. To better measure these risks, PJM proposes a new, third test that assesses the likelihood of requiring Limited DR in a seventh hour. Using the latest available modeling tools, as discussed above, PJM can assess that risk to a 90 percent confidence interval.

The new test supplements, and does not displace, the current test for the duration limit of Limited DR. Even if PJM does not need to call on Limited DR for a seventh hour, there can still be a risk that the application of Limited DR for only six hours will not reduce the PJM daily peak load by the full amount of the dispatched load reductions. PJM therefore must retain the existing duration test to measure that risk.

Accordingly, by this filing, PJM is amending the Tariff's definition of the Limited DR Reliability Target, at section 2.36B of Attachment DD to the Tariff, to add a third test of the limits on the response obligations of Limited DR.

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<sup>22</sup> See PJM Markets and Reliability Committee, Voting Report (Oct. 25, 2012), <http://www.pjm.com/~media/committees-groups/committees/mrc/20121025/20121025-mrc-20121025-voting-report.ashx>.



This new test will use a methodology similar to that used to assess the impact of the ten-interruption limitation. Both tests employ a procedure using an LOLE model that considers distributions of load levels and generation availability to determine the probability that Limited DR will be called upon beyond the Tariff-prescribed limits on required performance, i.e., for an eleventh time during a summer or a seventh hour during an event.

Thus, similar to the current test of the ten-times-per summer frequency limit, PJM will compare possible hourly loads on peak days under a range of weather conditions against the generation capacity on such days under a range of conditions and, by varying the assumed amounts of demand resources that are committed and that displace committed generation resources, will determine the level of Limited DR (as a percentage of peak load) at which there is a 90 percent probability that PJM will not have to call Limited DR to perform for more than six hours over any peak day.<sup>23</sup>

Moreover, like the ten-interruption test which uses a 90 percent confidence level, and consistent with the Commission's express approval of the 90 percent confidence level for that test,<sup>24</sup> PJM proposes to use a 90 percent confidence threshold to determine the amount of Limited DR commitment that raises reliability concerns. As PJM explained in Docket No. ER11-2288, a 90 percent confidence interval is widely used in statistical studies and commonly recognized as a reasonable standard to apply when interpreting results from probabilistic studies. For at least the past twenty years, PJM has used "90/10" load forecasts—where a forecast has a 10 percent chance of being exceeded in any year—to design the transmission system.<sup>25</sup>

The same assurance level should apply here. If this test is adopted, PJM can be 90 percent confident that it will not need to call on Limited DR for more than six hours on a given summer day, so long as the committed Limited DR equates to no more than the amount set by the Limited DR Reliability Target value.

As the Commission required PJM to describe the Limited DR Reliability Target determination method, and the two existing tests, in the Tariff, PJM is stating this third test in the Tariff as well. Because, as discussed above, this added test is similar to the existing ten-interruption test, PJM is using Tariff language, and a level of detail, for this test that is similar to the current description of the ten-interruption test in the Tariff. Like the other tests, this test will be applied to the PJM Region and to constrained Locational Deliverability Areas ("LDAs").

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<sup>23</sup> See proposed Tariff, Att. DD § 2.36B.

<sup>24</sup> January 2011 Order at P 74.

<sup>25</sup> See *supra* at 4; Answer of PJM Interconnection, L.L.C., Docket No. ER11-2288-000, at 24 (Jan. 7, 2011).

Consistent with the current approved method, PJM will set the Limited DR Reliability Target as the lowest of the results under the three tests. Each of the three tests measures an independent risk of reliance on the Limited DR product, and those risks exist simultaneously. If one test identifies Limited DR reliability risks at a lower level of Limited DR commitment, then PJM must recognize that risk, by basing the Limited DR Reliability Target on that identified and quantified risk. Failure to do so would result in PJM partially ignoring an identified risk.

### **III. ILLUSTRATION OF THE POSSIBLE IMPACT OF THIS TARIFF CHANGE ON RPM AUCTION CLEARING**

As discussed above, this change arose from PJM's expert planning staff's concern that the current tests for the Limited DR Reliability Target do not adequately capture one distinct reliability risk of excessive reliance on these limited capacity resources. The PJM Planning Committee, upon review of this matter, shared that concern. While this change, therefore, is largely motivated by reliability concerns, PJM also must be attentive to possible market impacts from market rule changes such as this.

Consequently, PJM reviewed the possible auction-clearing impacts of this change with its stakeholders during the stakeholder process. For this purpose, PJM has used data from the most recent BRA. No two auctions will clear in the same way, but a simulation based on the most recent auction should provide a helpful illustration of possible issues or impacts.

As explained above, PJM is adding a third test to the Limited DR Reliability Target, and is setting the target level at the lowest of the three test results, rather than the current rule of the lower of the two existing test results. This necessarily implies that the revised Tariff will sometimes result in a lower target; this change, standing alone, cannot produce a higher target. Applied to the most recent clearing results, however, the incremental reduction in the target level as a result of this change was relatively modest.

Specifically, PJM applied the proposed new Limited DR Reliability Target definition to the sell offers and other parameters that were recorded for the May 2012 RPM BRA, for both the unconstrained portion of the PJM region, and for any relevant constrained LDAs. When the current tests were applied to the parameters applicable for the PJM RTO in the May 2012 BRA, the ten-interruption test yielded a result of 8.5% and the six-hour duration test yielded a result of 4.8%. The proposed additional six-hour duration test, if applied to the May 2012 BRA parameters, would yield a result comparable to, but slightly lower than, the target under the existing duration test, i.e., 4.0%.

PJM next assessed the impact, if any, that these reliability target reductions could have had on the clearing prices in the May 2012 BRA, had this change been in effect then. To determine the impact of the new test, PJM simulated an alternative scenario for

the May 2012 RPM BRA,<sup>26</sup> replacing the RTO Limited DR Reliability Target of 4.8% (which was the value actually used in the 2012 BRA) with a target value of 4.0% (reflecting the effect of the new rules, as discussed above).

The analysis showed that the overall amount of demand resources committed in the auction remained the same, but that there was slightly lower commitment of Limited DR, and a correspondingly greater commitment of Extended Summer DR. This shift among DR product types, however, was entirely accommodated by linked DR offers. In other words, parties that offered and cleared as Limited DR in the 2012 BRA still cleared their resources in the simulation, but they cleared their resources as Extended Summer DR, and were compensated at the higher prices resulting from the price separation that already existed between the two DR products. Thus, there would have been no change to the clearing prices in the BRA, and no clear adverse impacts to Limited DR providers under this scenario. While the clearing prices for the demand response product categories would not have changed, PJM estimates that this scenario would have resulted in a very slight increase in cost to load of 0.08%, because of the shift of some demand resources from the lower priced category of Limited DR to the higher priced category of Extended Summer DR in areas where those prices separated.

PJM views impacts of this magnitude as well within an acceptable range for ancillary market effects of a change that provides increased assurance of reliability.

Aside from this simulation, a larger picture view of the recent clearing results adds to the indications that this change is not likely to have disabling negative side effects on the market. First, this incremental adjustment to the reliability target calculation method seems very unlikely to have impacts greater than those from the establishment of a Limited DR Reliability Target in the first place. Yet, demand resource participation in the RPM auctions grew dramatically in both BRAs conducted after this target was implemented, with offered MWs increasing by 20% in the first year, and 28% in the second year.<sup>27</sup> PJM also notes that this change does not impact the ability of DR providers to continue to aggregate demand response resources and to manage demand response performance across a portfolio of resources.

Second, the two BRAs conducted to date establish convincingly that demand response providers have been successful in qualifying most of their resources as higher-value Extended Summer DR or Annual DR. As described above, 63% of the demand resources offered in the May 2011 BRA had linked offers, because the resources qualified as multiple product types. Similarly, 57% of the demand resources offered in the May 2012 BRA had linked offers. In short, the new market rules, with the prospect of higher prices for less-limited resources, have spurred demand response providers to

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<sup>26</sup> A Delivery Year is a PJM planning year that extends from June 1 of a calendar year to May 31 of the following calendar year.

<sup>27</sup> *See supra* at 6.

ensure that most of their resources can qualify as one or more of the less-limited resources. This value-enhancing market response will mitigate for these demand response providers the impacts of any incremental reduction in the commitment level of Limited DR that is deemed compatible with reliability, and commensurately minimize the price impact to load of committing any such reduction.

#### IV. ISSUES RAISED IN STAKEHOLDER PROCESS

As noted above, these Tariff changes garnered majority support in the PJM stakeholder process, but not a two-thirds supermajority support. The voting report suggests that this was largely due to opposition from stakeholder segments that typically represent demand response resources, including curtailment service providers (“CSPs”).<sup>28</sup>

PJM notes that before both the PJM Planning Committee and the PJM Markets and Reliability Committee, a group of CSPs commented that they “are not persuaded that the Limited DR Reliability Target proposal is necessary to meet existing reliability requirements.”<sup>29</sup> In addition, the CSPs asserted that “[s]ignificant questions remain regarding underlying assumptions with respect to dispatch.”<sup>30</sup>

While PJM acknowledges that these parties may choose to submit their own comments in this docket, PJM understands that their concern is that there might be ways for PJM to dispatch demand resources more efficiently such that PJM could take better advantage of these resources before they exceed their performance obligation limitations. As PJM understands their argument, if PJM can make better, more efficient use of Limited DR through altered dispatch practices, then PJM will not have to turn as quickly to Extended Summer or Annual Resources, and consequently could accommodate a higher target level for participation of Limited DR.

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<sup>28</sup> See PJM Markets and Reliability Committee, Voting Report (Oct. 25, 2012), <http://www.pjm.com/~media/committees-groups/committees/mrc/20121025/20121025-mrc-20121025-voting-report.ashx>.

<sup>29</sup> See PJM Planning Committee, *Limited DR Proposal DR Supporter Comments*, 2, (Oct. 11, 2012), <http://www.pjm.com/~media/committees-groups/committees/pc/20121011/20121011-item-07-dr-supporters-on-limited-dr-proposal.ashx>; PJM MRC, *Limited DR Proposal: DR Supporter Comments*, 2, (Oct. 25, 2012), <http://www.pjm.com/~media/committees-groups/committees/mrc/20121025/20121025-item-05-dr-supporters-on-limited-dr-proposal.ashx>.

<sup>30</sup> *Id.* at 3.

PJM is prepared to facilitate a stakeholder discussion about changing its assumptions for dispatch of demand resources.<sup>31</sup> However, such discussion necessarily must include the dispatch limitations of Limited DR, as prescribed by the current rules (e.g., the requirement that PJM must provide demand response resources with up to two-hours notice prior to curtailment), as these limitations restrict PJM's dispatch of demand resources.

While PJM will answer, as necessary, any elaboration the CSPs may offer in this docket on the concerns they expressed in the stakeholder process, PJM at this time will simply note the following points:

First, PJM stands by its independent assessment of the reliability concerns. The Commission has already clearly established, through the January 2011 Order, that it is appropriate to recognize the reliability implications of reliance on capacity resources with severe limits on their obligation to respond, and mitigate those risks through market rules that enhance both flexibility and efficiency. The only issue now is whether the two existing tests capture one readily identifiable aspect of that reliability concern, i.e., the risk that PJM would need to call for a seventh hour on resources that only are required to respond for six hours. As shown above, the existing tests are not designed to directly capture that risk. The added test leverages improved hourly load modeling capabilities to address directly that very risk.

Further, as PJM demonstrated during the stakeholder process, assuming a more efficient dispatch of Limited DR would not alter the results of this proposed additional test. As shown in the below-cited presentation to the Markets and Reliability Committee, there is a 10% chance that all committed Limited DR would be required for seven hours given the level of DR determined by this third test.<sup>32</sup> Therefore, since at least 10% of the time, PJM would need *all* of the committed Limited DR for a full seven hours, PJM cannot reliably assume that Limited DR could be dispatched on a staggered or gradual basis, or released from dispatch on a staggered or gradual basis. This form of "more

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<sup>31</sup> In fact, the Commission has recognized PJM's commitment "to review the DR Reliability Target Analysis Procedures with stakeholders on an ongoing basis." January 2011 Order at P 73; *see also* Informational Filing of PJM Interconnection, L.L.C., Docket No. ER11-2288-000 (Aug. 1, 2011) (describing the status of PJM's efforts, in collaboration with its stakeholders, to improve the efficiency of PJM's dispatch of demand resources). Indeed, PJM recently modified its dispatch practices so that PJM can dispatch Demand Resources on a more targeted and efficient basis. *See PJM Interconnection, L.L.C.*, 139 FERC ¶ 61,165 (2012) (accepting Tariff changes related to implementation of sub-Zonal dispatch of Demand Resources).

<sup>32</sup> *See* PJM Markets and Reliability Committee, *Determination of Limited DR Reliability Target*, 5 (Oct. 25, 2012), <http://www.pjm.com/~media/committees-groups/committees/mrc/20121025/20121025-item-05-limited-dr-target.ashx>.

efficient” dispatch, suggested in the stakeholder process by some CSPs, therefore would not be a prudent assumption for the Limited DR Reliability Target calculation.

Second, as PJM understands the CSPs’ concerns, there is an inherent tension in this area between what the CSPs believe they reasonably would do when called upon by PJM, and what they are required to do under the Tariff. PJM credits and sympathizes with their concern; daily, good faith interactions between PJM and resource providers are a foundation of successful grid management.

However, reliability planning for emergency operations demands a tighter standard. The Commission recognized this point in the January 2011 Order, disagreeing with a CSP that argued that RPM’s Emergency Procedure Charge “implies that Limited DR resources must respond beyond the obligations of the Limited DR product (i.e., beyond ten events, six hours, or outside of the June to September timeframe).”<sup>33</sup> To the contrary, the Commission found, “although PJM can *request* emergency demand resources to respond during emergency events, these resources *are not required to respond if they have already satisfied their obligations.*”<sup>34</sup> In devising market rules like the Limited DR Reliability Target, system planners reasonably assume, particularly when planning for peak-period emergency operations, that capacity resources will not respond more than they are bound by the Tariff to respond.

These sorts of assumptions are not set in stone, however. If there develops a consistent, predictable pattern of response by most demand response providers that demonstrates provision of reductions beyond Tariff limits, planners could reasonably take that into account. Dispatch rules and practices also can and do change. As the Commission knows, PJM recently modified its demand resource dispatch practices to facilitate calling for reductions on a more targeted geographic basis.<sup>35</sup> PJM and its stakeholders undoubtedly will continue to assess and refine existing dispatch limitations. As these sorts of changes are implemented and all parties gain experience with actual operations under such revised rules, system planners can acquire greater confidence in modifying their assumptions about the expected responses of capacity resource, including demand resources, during peak periods. PJM remains committed to advancing these efforts.

## V. EFFECTIVE DATE

The enclosed Tariff revisions reflect an effective date of January 31, 2013, i.e., 62 days after the date of this filing. This filing envisions an adjustment to the procedures for identifying the maximum amount of Limited DR that can be committed in an RPM

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<sup>33</sup> January 2011 Order at P 33.

<sup>34</sup> *Id.* (emphasis added).

<sup>35</sup> *See PJM Interconnection, L.L.C.*, 139 FERC ¶ 61,165.

auction while assuring the reliability of the PJM Region and relevant LDAs. PJM is scheduled to conduct its next RPM BRA in May 2013 and must post relevant parameters for that auction by February 1, 2013. The enclosed Tariff changes could change the calculation of the Limited DR Reliability Target, which is one of the parameters that PJM must post at that time. The requested effective date will allow PJM to reflect this revised calculation method in that posting.

## **VI. CORRESPONDENCE**

The following individuals are designated for inclusion on the official service list in this proceeding and for receipt of any communications regarding this filing:

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## **VII. DOCUMENTS ENCLOSED**

PJM encloses with this transmittal letter:

- (1) Attachment A – Peak Load Reduction Graph;
- (2) Attachment B – redline version of the revised section to the electronic tariff; and
- (3) Attachment C – clean version of the revised section to the electronic tariff.

## VIII. SERVICE

PJM has served a copy of this filing on all PJM members and on all state utility regulatory commissions in the PJM Region by posting this filing electronically. In accordance with the Commission's regulations,<sup>36</sup> PJM will post a copy of this filing to the FERC filings section of its internet site, located at the following link: <http://www.pjm.com/documents/ferc-manuals/ferc-filings.aspx> with a specific link to the newly-filed document, and will send an e-mail on the same date as this filing to all PJM members and all state utility regulatory commissions in the PJM Region<sup>37</sup> alerting them that this filing has been made by PJM and is available by following such link. If the document is not immediately available by using the referenced link, the document will be available through the referenced link within 24 hours of the filing. Also, a copy of this filing will be available on the Commission's eLibrary website located at the following link: <http://www.ferc.gov/docs-filing/elibrary.asp> in accordance with the Commission's regulations and Order No. 714.

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<sup>36</sup> See 18 C.F.R. §§ 35.2(e) and 385.2010(f)(3).

<sup>37</sup> PJM already maintains, updates and regularly uses e-mail lists for all PJM members and affected state commissions.



**IX. CONCLUSION**

Accordingly, PJM requests that the Commission accept the enclosed Tariff, revisions, effective January 31, 2013.

Respectfully submitted,

/s/ Paul M. Flynn

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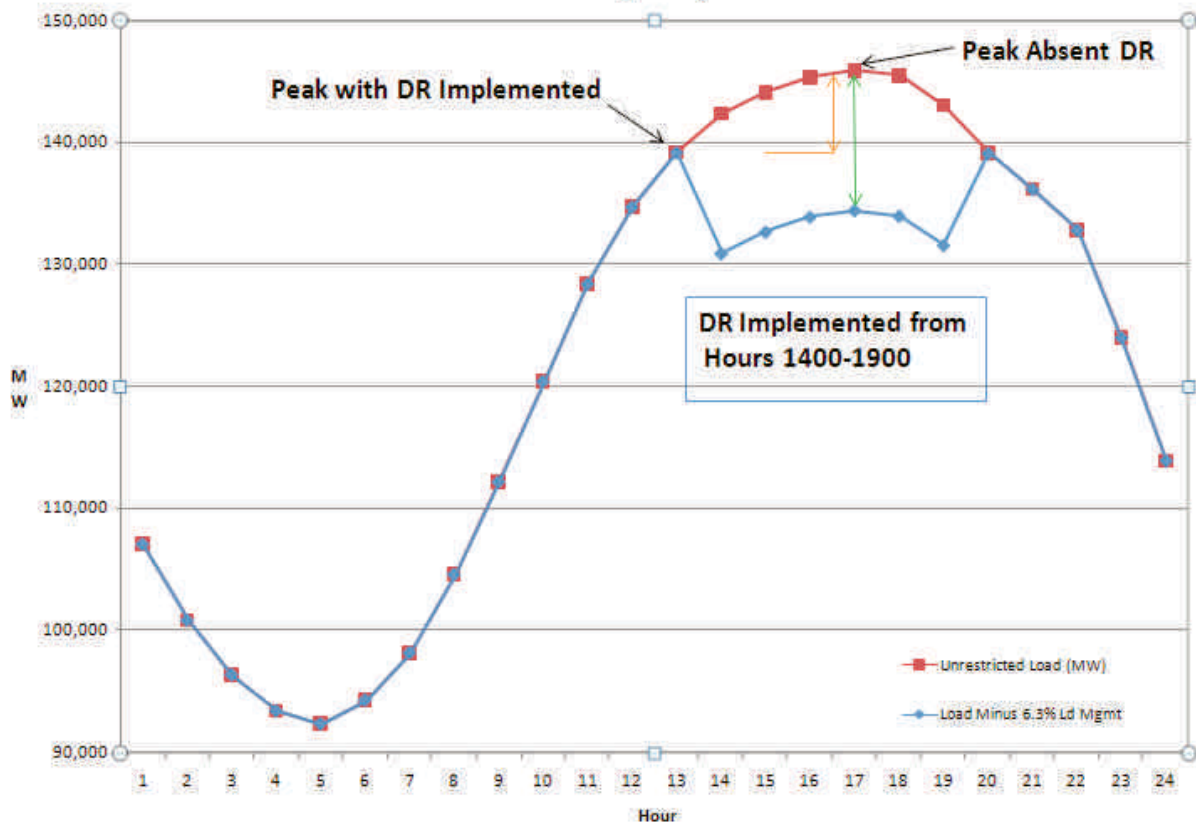
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November 30, 2012

**Attachment A**  
**Peak Load Reduction Graph**

### PJM RTO - August 2, 2006



**Attachment B**  
**Redline Tariff Changes**

## **2. DEFINITIONS**

Definitions specific to this Attachment are set forth below. In addition, any capitalized terms used in this Attachment not defined herein shall have the meaning given to such terms elsewhere in this Tariff or in the RAA. References to section numbers in this Attachment DD refer to sections of this attachment, unless otherwise specified.

### **2.1A Annual Demand Resource**

“Annual Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.1B Annual Resource**

“Annual Resource” shall mean a Generation Capacity Resource, an Energy Efficiency Resource or an Annual Demand Resource.

### **2.1C Annual Resource Price Adder**

“Annual Resource Price Adder” shall mean an addition to the marginal value of Unforced Capacity and the Extended Summer Resource Price Adder as necessary to reflect the price of Annual Resources required to meet the applicable Minimum Annual Resource Requirement.

### **2.1D Annual Revenue Rate**

“Annual Revenue Rate” shall mean the rate employed to assess a compliance penalty charge on a Demand Resource Provider or ILR Provider under section 11.

## **2.2 Avoidable Cost Rate**

“Avoidable Cost Rate” shall mean a component of the Market Seller Offer Cap calculated in accordance with section 6.

## **2.3 Base Load Generation Resource**

“Base Load Generation Resource” shall mean a Generation Capacity Resource that operates at least 90 percent of the hours that it is available to operate, as determined by the Office of the Interconnection in accordance with the PJM Manuals.

## **2.4 Base Offer Segment**

“Base Offer Segment” shall mean a component of a Sell Offer based on an existing Generation Capacity Resource, equal to the Unforced Capacity of such resource, as determined in accordance with the PJM Manuals. If the Sell Offers of multiple Market Sellers are based on a single existing Generation Capacity Resource, the Base Offer Segments of such Market Sellers

shall be determined pro rata based on their entitlements to Unforced Capacity from such resource.

## **2.5 Base Residual Auction**

“Base Residual Auction” shall mean the auction conducted three years prior to the start of the Delivery Year to secure commitments from Capacity Resources as necessary to satisfy any portion of the Unforced Capacity Obligation of the PJM Region not satisfied through Self-Supply.

## **2.6 Buy Bid**

“Buy Bid” shall mean a bid to buy Capacity Resources in any Incremental Auction.

## **2.7 Capacity Credit**

“Capacity Credit” shall have the meaning specified in Schedule 11 of the Operating Agreement, including Capacity Credits obtained prior to the termination of such Schedule applicable to periods after the termination of such Schedule.

## **2.8 Capacity Emergency Transfer Limit**

“Capacity Emergency Transfer Limit” or “CETL” shall have the meaning provided in the Reliability Assurance Agreement.

## **2.9 Capacity Emergency Transfer Objective**

“Capacity Emergency Transfer Objective” or “CETO” shall have the meaning provided in the Reliability Assurance Agreement.

## **2.9A Capacity Export Transmission Customer**

“Capacity Export Transmission Customer” shall mean a customer taking point to point transmission service under Part II of this Tariff to export capacity from a generation resource located in the PJM Region that is delisted from Capacity Resource status as described in section 5.6.6(d).

## **2.10 Capacity Market Buyer**

“Capacity Market Buyer” shall mean a Member that submits bids to buy Capacity Resources in any Incremental Auction.

## **2.11 Capacity Market Seller**

“Capacity Market Seller” shall mean a Member that owns, or has the contractual authority to control the output or load reduction capability of, a Capacity Resource, that has not transferred

such authority to another entity, and that offers such resource in the Base Residual Auction or an Incremental Auction.

## **2.12 Capacity Resource**

“Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.13 Capacity Resource Clearing Price**

“Capacity Resource Clearing Price” shall mean the price calculated for a Capacity Resource that offered and cleared in a Base Residual Auction or Incremental Auction, in accordance with Section 5.

## **2.14 Capacity Transfer Right**

“Capacity Transfer Right” shall mean a right, allocated to LSEs serving load in a Locational Deliverability Area, to receive payments, based on the transmission import capability into such Locational Deliverability Area, that offset, in whole or in part, the charges attributable to the Locational Price Adder, if any, included in the Zonal Capacity Price calculated for a Locational Delivery Area.

### **2.14A Conditional Incremental Auction**

“Conditional Incremental Auction” shall mean an Incremental Auction conducted for a Delivery Year if and when necessary to secure commitments of additional capacity to address reliability criteria violations arising from the delay in a Backbone Transmission upgrade that was modeled in the Base Residual Auction for such Delivery Year.

## **2.15 CONE Area**

“CONE Area” shall mean the areas listed in section 5.10(a)(iv)(A) and any LDAs established as CONE Areas pursuant to section 5.10(a)(iv)(B).

## **2.16 Cost of New Entry**

“Cost of New Entry” or “CONE” shall mean the nominal levelized cost of a Reference Resource, as determined in accordance with section 5.

### **2.16A Credit-Limited Offer**

“Credit-Limited Offer” shall have the meaning provided in Attachment Q to this Tariff.

## **2.17 Daily Deficiency Rate**

“Daily Deficiency Rate” shall mean the rate employed to assess certain deficiency charges under sections 7, 8, 9, or 13.

## **2.18 Daily Unforced Capacity Obligation**

“Daily Unforced Capacity Obligation” shall mean the capacity obligation of a Load Serving Entity during the Delivery Year, determined in accordance with Schedule 8 of the Reliability Assurance Agreement.

## **2.19 Delivery Year**

Delivery Year shall mean the Planning Period for which a Capacity Resource is committed pursuant to the auction procedures specified in Section 5.

## **2.20 Demand Resource**

“Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.21 Demand Resource Factor**

“Demand Resource Factor” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.22 Demand Resource Provider**

“Demand Resource Provider” shall mean a PJM Member that has the capability to reduce load, or that aggregates customers capable of reducing load. The Demand Resource Provider shall notify the Office of the Interconnection whether such load reduction is provided by a Limited Demand Resource, Extended Summer Demand Resource or an Annual Demand Resource. A Curtailment Service Provider, as defined in the Operating Agreement, may be a Demand Resource Provider, provided it qualifies its load reduction capability as a Limited Demand Resource, Extended Summer Demand Resource, or Annual Demand Resource.

## **2.23 EFORD**

“EFORD” shall have the meaning specified in the PJM Reliability Assurance Agreement.

## **2.24 Energy Efficiency Resource**

“Energy Efficiency Resource” shall have the meaning specified in the PJM Reliability Assurance Agreement.

## **2.24A Extended Summer Demand Resource**

“Extended Summer Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.24B Extended Summer Resource Price Adder**



“Extended Summer Resource Price Adder” shall mean an addition to the marginal value of Unforced Capacity as necessary to reflect the price of Annual Resources and Extended Summer Demand Resources required to meet the applicable Minimum Extended Summer Resource Requirement.

### **2.24C Extended Summer Demand Resource Reliability Target**

“Extended Summer Demand Resource Reliability Target” for the PJM Region or an LDA, shall mean the maximum amount of the combination of Extended Summer Demand Resources and Limited Demand Resources in Unforced Capacity determined by PJM to be consistent with the maintenance of reliability, stated in Unforced Capacity, that shall be used to calculate the Minimum Annual Resource Requirement. As more fully set forth in the PJM Manuals, PJM calculates the Extended Summer DR Reliability Target, by first determining a reference annual loss of load expectation (“LOLE”) assuming no Demand Resources. The calculation for the unconstrained portion of the PJM Region uses a daily distribution of loads under a range of weather scenarios (based on the most recent load forecast and iteratively shifting the load distributions to result in the Installed Reserve Margin established for the Delivery Year in question) and a weekly capacity distribution (based on the cumulative capacity availability distributions developed for the Installed Reserve Margin study for the Delivery Year in question). The calculation for each relevant LDA uses a daily distribution of loads under a range of weather scenarios (based on the most recent load forecast for the Delivery Year in question) and a weekly capacity distribution (based on the cumulative capacity availability distributions developed for the Capacity Emergency Transfer Objective study for the Delivery Year in question). For the relevant LDA calculation, the weekly capacity distributions are adjusted to reflect the Capacity Emergency Transfer Limit for the Delivery Year in question.

For both the PJM Region and LDA analyses, PJM then models the commitment of varying amounts of DR (displacing otherwise committed generation) as interruptible from May 1 through October 31 and unavailable from November 1 through April 30 and calculates the LOLE at each DR level. The Extended Summer DR Reliability Target is the DR amount, stated as a percentage of the unrestricted peak load, that produces no more than a ten percent increase in the LOLE, compared to the reference value. The Extended Summer Demand Resource Reliability Target shall be expressed as a percentage of the forecasted peak load of the PJM Region or such LDA and is converted to Unforced Capacity by multiplying [the reliability target percentage] times [the Forecast Pool Requirement] times [the DR Factor] times [the forecasted peak load of the PJM Region or such LDA, reduced by the amount of load served under the FRR Alternative].

### **2.25 [Reserved]**

### **2.26 Final RTO Unforced Capacity Obligation**

“Final RTO Unforced Capacity Obligation” shall mean the capacity obligation for the PJM Region, determined in accordance with Schedule 8 of the Reliability Assurance Agreement.

### **2.26A Final Zonal ILR Price**

“Final Zonal ILR Price” shall mean the Adjusted Zonal Capacity Price after the Second Incremental Auction, less the amount paid in CTR credits per MW of load in the Zone in which the ILR is to be certified.

### **2.27 First Incremental Auction**

“First Incremental Auction” shall mean an Incremental Auction conducted 20 months prior to the start of the Delivery Year to which it relates.

### **2.28 Forecast Pool Requirement**

“Forecast Pool Requirement” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.29 Forecast RTO ILR Obligation**

“Forecast RTO ILR Obligation” shall mean, in unforced capacity terms, the ILR Forecast for the PJM Region times the DR Factor, times the Forecast Pool Requirement, less the Unforced Capacity of all Demand Resources committed in FRR Capacity Plans by all FRR Entities in the PJM Region, for use in Delivery Years through May 31, 2012.

### **2.30 Forecast Zonal ILR Obligation**

“Forecast Zonal ILR Obligation” shall mean, in unforced capacity terms, the ILR Forecast for the Zone times the DR Factor, times the Forecast Pool Requirement, less the Unforced Capacity of all Demand Resources committed in FRR Capacity Plans by all FRR Entities in such Zone, for use in Delivery Years through May 31, 2012.

### **2.31 Generation Capacity Resource**

“Generation Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.32 ILR Forecast**

“ILR Forecast” shall mean, for any Delivery Year ending on or before May 31, 2012, the average annual megawatt quantity of ILR certified for the five Planning Periods preceding the date of the forecast; provided, however, that before such data becomes available for five Delivery Years under the Reliability Pricing Model, comparable data on Active Load Management (as defined in the preexisting reliability assurance agreements) from up to five prior Planning Periods shall be substituted as necessary; and provided further that, for transmission zones that were integrated into the PJM Region less than five years prior to the conduct of the Base Residual Auction for the Delivery Year, data on incremental load subject to mandatory interruption by Electric Distribution Companies within such zones shall be substituted as necessary.

### **2.33 ILR Provider**

“ILR Provider” shall mean a Member that has the capability to reduce load, or that aggregates customers capable of reducing load. A Curtailment Service Provider, as such term is defined in the PJM Operating Agreement, may be an ILR Provider, provided it obtains certification of its load reduction capability as ILR.

### **2.34 Incremental Auction**

“Incremental Auction” shall mean any of several auctions conducted for a Delivery Year after the Base Residual Auction for such Delivery Year and before the first day of such Delivery Year, including the First Incremental Auction, Second Incremental Auction, Third Incremental Auction or Conditional Incremental Auction. Incremental Auctions (other than the Conditional Incremental Auction), shall be held for the purposes of:

(i) allowing Market Sellers that committed Capacity Resources in the Base Residual Auction for a Delivery Year, which subsequently are determined to be unavailable to deliver the committed Unforced Capacity in such Delivery Year (due 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) to submit Buy Bids for replacement Capacity Resources; and

(ii) allowing the Office of the Interconnection to reduce or increase the amount of committed capacity secured in prior auctions for such Delivery Year if, as a result of changed circumstances or expectations since the prior auction(s), there is, respectively, a significant excess or significant deficit of committed capacity for such Delivery Year, for the PJM Region or for an LDA.

### **2.35 Incremental Capacity Transfer Right**

“Incremental Capacity Transfer Right” shall mean a Capacity Transfer Right allocated to a Generation Interconnection Customer or Transmission Interconnection Customer obligated to fund a transmission facility or upgrade, to the extent such upgrade or facility increases the transmission import capability into a Locational Deliverability Area, or a Capacity Transfer Right allocated to a Responsible Customer in accordance with Schedule 12A of the Tariff.

### **2.36 Interruptible Load for Reliability (ILR)**

“Interruptible Load for Reliability” or “ILR” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.36A Limited Demand Resource**

“Limited Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## 2.36B Limited Demand Resource Reliability Target

“Limited Demand Resource Reliability Target” for the PJM Region or an LDA, shall mean the maximum amount of Limited Demand Resources determined by PJM to be consistent with the maintenance of reliability, stated in Unforced Capacity that shall be used to calculate the Minimum Extended Summer Demand Resource Requirement for the PJM Region or such LDA. As more fully set forth in the PJM Manuals, PJM calculates the Limited Demand Resource Reliability Target by first: i) testing the effects of the ten-interruption requirement by comparing possible loads on peak days under a range of weather conditions (from the daily load forecast distributions for the Delivery Year in question) against possible generation capacity on such days under a range of conditions (using the cumulative capacity distributions employed in the Installed Reserve Margin study for the PJM Region and in the Capacity Emergency Transfer Objective study for the relevant LDAs for such Delivery Year) and, by varying the assumed amounts of DR that is committed and displaces committed generation, determines the DR penetration level at which there is a ninety percent probability that DR will not be called (based on the applicable operating reserve margin for the PJM Region and for the relevant LDAs) more than ten times over those peak days; ~~and~~ ii) testing the six-hour duration requirement by calculating the MW difference between the highest hourly unrestricted peak load and seventh highest hourly unrestricted peak load on certain high peak load days (e.g., the annual peak, loads above the weather normalized peak, or days where load management was called) in recent years, then dividing those loads by the forecast peak for those years and averaging the result; ~~and (iii) (for the 2016-2017 and subsequent Delivery Years) testing the effects of the six-hour duration requirement by comparing possible hourly loads on peak days under a range of weather conditions (from the daily load forecast distributions for the Delivery Year in question) against possible generation capacity on such days under a range of conditions (using a Monte Carlo model of hourly capacity levels that is consistent with the capacity model employed in the Installed Reserve Margin study for the PJM Region and in the Capacity Emergency Transfer Objective study for the relevant LDAs for such Delivery Year) and, by varying the assumed amounts of DR that is committed and displaces committed generation, determines the DR penetration level at which there is a ninety percent probability that DR will not be called (based on the applicable operating reserve margin for the PJM Region and for the relevant LDAs) for more than six hours over any one or more of the tested peak days.~~ Second, PJM adopts the lowest~~st~~ result from these ~~tw~~~~o~~~~th~~~~ree~~ tests as the Limited Demand Resource Reliability Target. The Limited Demand Resource Reliability Target shall be expressed as a percentage of the forecasted peak load of the PJM Region or such LDA and is converted to Unforced Capacity by multiplying [the reliability target percentage] times [the Forecast Pool Requirement] times [the DR Factor] times [the forecasted peak load of the PJM Region or such LDA, reduced by the amount of load served under the FRR Alternative].

## 2.37 Load Serving Entity (LSE)

“Load Serving Entity” or “LSE” shall have the meaning specified in the Reliability Assurance Agreement.

## 2.38 Locational Deliverability Area (LDA)

“Locational Deliverability Area” or “LDA” shall mean a geographic area within the PJM Region that has limited transmission capability to import capacity to satisfy such area’s reliability requirement, as determined by the Office of the Interconnection in connection with preparation of the Regional Transmission Expansion Plan, and as specified in Schedule 10.1 of the Reliability Assurance Agreement.

### **2.39 Locational Deliverability Area Reliability Requirement**

“Locational Deliverability Area Reliability Requirement” shall mean the projected internal capacity in the Locational Deliverability Area plus the Capacity Emergency Transfer Objective for the Delivery Year, as determined by the Office of the Interconnection in connection with preparation of the Regional Transmission Expansion Plan, less the minimum internal resources required for all FRR Entities in such Locational Deliverability Area, and less any necessary adjustment for Price Responsive Demand proposed in a PRD Plan or committed following an RPM Auction for the Zones comprising such Locational Deliverability Area for such Delivery Year.

### **2.40 Locational Price Adder**

“Locational Price Adder” shall mean an addition to the marginal value of Unforced Capacity within an LDA as necessary to reflect the price of Capacity Resources required to relieve applicable binding locational constraints.

### **2.41 Locational Reliability Charge**

“Locational Reliability Charge” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.41A Locational UCAP**

“Locational UCAP” shall mean unforced capacity that a Member with available uncommitted capacity sells in a bilateral transaction to a Member that previously committed capacity through an RPM Auction but now requires replacement capacity to fulfill its RPM Auction commitment. The Locational UCAP Seller retains responsibility for performance of the resource providing such replacement capacity.

#### **2.41B Locational UCAP Seller**

“Locational UCAP Seller” shall mean a Member that sells Locational UCAP.

#### **2.41C Market Seller Offer Cap**

“Market Seller Offer Cap” shall mean a maximum offer price applicable to certain Market Sellers under certain conditions, as determined in accordance with section 6 of Attachment DD and section II.E of Attachment M - Appendix.

#### **2.41D Minimum Annual Resource Requirement**

“Minimum Annual Resource Requirement” shall mean the minimum amount of capacity that PJM will seek to procure from Annual Resources for the PJM Region and for each Locational Deliverability Area for which the Office of the Interconnection is required under section 5.10(a) of this Attachment DD to establish a separate VRR Curve for such Delivery Year. For the PJM Region, the Minimum Annual Resource Requirement shall be equal to the RTO Reliability Requirement minus [the Extended Summer Demand Resource Reliability Target for the RTO in Unforced Capacity]. For an LDA, the Minimum Annual Resource Requirement shall be equal to the LDA Reliability Requirement minus [the LDA CETL] minus [the Extended Summer Demand Resource Reliability Target for such LDA in Unforced Capacity]. The LDA CETL may be adjusted pro rata for the amount of load served under the FRR Alternative.

#### **2.41E Minimum Extended Summer Resource Requirement**

“Minimum Extended Summer Resource Requirement” shall mean the minimum amount of capacity that PJM will seek to procure from Extended Summer Demand Resources and Annual Resources for the PJM Region and for each Locational Deliverability Area for which the Office of the Interconnection is required under section 5.10(a) of this Attachment DD to establish a separate VRR Curve for such Delivery Year. For the PJM Region, the Minimum Extended Summer Resource Requirement shall be equal to the RTO Reliability Requirement minus [the Limited Demand Resource Reliability Target for the PJM Region in Unforced Capacity]. For an LDA, the Minimum Extended Summer Resource Requirement shall be equal to the LDA Reliability Requirement minus [the LDA CETL] minus [the Limited Demand Resource Reliability Target for such LDA in Unforced Capacity]. The LDA CETL may be adjusted pro rata for the amount of load served under the FRR Alternative.

#### **2.42 Net Cost of New Entry**

“Net Cost of New Entry” shall mean the Cost of New Entry minus the Net Energy and Ancillary Service Revenue Offset, as defined in Section 5.

#### **2.43 Nominated Demand Resource Value**

“Nominated Demand Resource Value” shall mean the amount of load reduction that a Demand Resource commits to provide either through direct load control, firm service level or guaranteed load drop programs. For existing Demand Resources, the maximum Nominated Demand Resource Value is limited, in accordance with the PJM Manuals, to the value appropriate for the method by which the load reduction would be accomplished, at the time the Base Residual Auction or Incremental Auction is being conducted.

#### **2.43A Nominated Energy Efficiency Value**

“Nominated Energy Efficiency Value” shall mean the amount of load reduction that an Energy Efficiency Resource commits to provide through installation of more efficient devices or equipment or implementation of more efficient processes or systems.

#### **2.44 Nominated ILR Value**

“Nominated ILR Value” shall mean the amount of load reduction that an ILR resource commits to provide either through direct load control, firm service level or guaranteed load drop programs. For ILR, the maximum Nominated ILR Capacity Value is limited, in accordance with the PJM Manuals, to the value appropriate for the method by which the load reduction would be accomplished, at the time the ILR is certified.

#### **2.45 Opportunity Cost**

“Opportunity Cost” shall mean a component of the Market Seller Offer Cap calculated in accordance with section 6.

#### **2.46 Peak-Hour Dispatch**

“Peak-Hour Dispatch” shall mean, for purposes of calculating the Energy and Ancillary Services Revenue Offset under section 5 of this Attachment, an assumption, as more fully set forth in the PJM Manuals, that the Reference Resource is committed in the Day-Ahead Energy Market in four distinct blocks of four hours of continuous output for each block from the peak-hour period beginning with the hour ending 0800 EPT through to the hour ending 2300 EPT for any day when the average day-ahead LMP for the area for which the Net Cost of New Entry is being determined is greater than, or equal to, the cost to generate (including the cost for a complete start and shutdown cycle) for at least two hours during each four-hour block, where such blocks shall be assumed to be committed independently; provided that, if there are not at least two economic hours in any given four-hour block, then the Reference Resource shall be assumed not to be committed for such block; and to the extent not committed in any such block in the Day-Ahead Energy Market under the above conditions based on Day-Ahead LMPs, is dispatched in the Real-Time Energy Market for such block if the Real-Time LMP is greater than or equal to the cost to generate under the same conditions as described above for the Day-Ahead Energy Market.

#### **2.47 Peak Season**

“Peak Season” shall mean the weeks containing the 24th through 36th Wednesdays of the calendar year. Each such week shall begin on a Monday and end on the following Sunday, except for the week containing the 36th Wednesday, which shall end on the following Friday.

#### **2.48 Percentage Internal Resources Required**

“Percentage Internal Resources Required” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.49 Planned Demand Resource**

“Planned Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.50 Planned External Generation Capacity Resource**

“Planned External Generation Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.50A Planned Generation Capacity Resource**

“Planned Generation Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.51 Planning Period**

“Planning Period” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.52 PJM Region**

“PJM Region” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.53 PJM Region Installed Reserve Margin**

“PJM Region Installed Reserve Margin” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.54 PJM Region Peak Load Forecast**

“PJM Region Peak Load Forecast” shall mean the peak load forecast used by the Office of the Interconnection in determining the PJM Region Reliability Requirement, and shall be determined on both a preliminary and final basis as set forth in section 5.

#### **2.55 PJM Region Reliability Requirement**

“PJM Region Reliability Requirement” shall mean, for purposes of the Base Residual Auction, the Forecast Pool Requirement multiplied by the Preliminary PJM Region Peak Load Forecast, less the sum of all Preliminary Unforced Capacity Obligations of FRR Entities in the PJM Region; and, for purposes of the Incremental Auctions, the Forecast Pool Requirement multiplied by the updated PJM Region Peak Load Forecast, less the sum of all updated Unforced Capacity Obligations of FRR Entities in the PJM Region, and less any necessary adjustment for Price Responsive Demand proposed in a PRD Plan or committed following an RPM Auction (as applicable) for such Delivery Year.

#### **2.56 Projected PJM Market Revenues**



“Projected PJM Market Revenues” shall mean a component of the Market Seller Offer Cap calculated in accordance with section 6.

### **2.57 Qualifying Transmission Upgrade**

“Qualifying Transmission Upgrade” shall mean a proposed enhancement or addition to the Transmission System that: (a) will increase the Capacity Emergency Transfer Limit into an LDA by a megawatt quantity certified by the Office of the Interconnection; (b) the Office of the Interconnection has determined will be in service on or before the commencement of the first Delivery Year for which such upgrade is the subject of a Sell Offer in the Base Residual Auction; (c) is the subject of a Facilities Study Agreement executed before the conduct of the Base Residual Auction for such Delivery Year and (d) a New Service Customer is obligated to fund through a rate or charge specific to such facility or upgrade.

### **2.58 Reference Resource**

“Reference Resource” shall mean a combustion turbine generating station, configured with two General Electric Frame 7FA turbines with inlet air cooling to 50 degrees, Selective Catalytic Reduction technology in CONE Areas 1, 2, 3, and 4, dual fuel capability, and a heat rate of 10.096 Mmbtu/ MWh.

### **2.59 Reliability Assurance Agreement**

“Reliability Assurance Agreement” shall mean that certain “Reliability Assurance Agreement Among Load-Serving Entities in the PJM Region,” on file with FERC as PJM Interconnection, L.L.C. Rate Schedule FERC No.44.

### **2.60 Reliability Pricing Model Auction**

“Reliability Pricing Model Auction” or “RPM Auction” shall mean the Base Residual Auction or any Incremental Auction.

### **2.61 Resource Substitution Charge**

“Resource Substitution Charge” shall mean a charge assessed on Capacity Market Buyers in an Incremental Auction to recover the cost of replacement Capacity Resources.

### **2.61A Scheduled Incremental Auctions**

“Scheduled Incremental Auctions” shall refer to the First, Second, or Third Incremental Auction.

### **2.62 Second Incremental Auction**

“Second Incremental Auction” shall mean an Incremental Auction conducted ten months before the Delivery Year to which it relates.

## **2.63 Sell Offer**

“Sell Offer” shall mean an offer to sell Capacity Resources in a Base Residual Auction, Incremental Auction, or Reliability Backstop Auction.

## **2.64 [Reserved for Future Use]**

## **2.65 Self-Supply**

“Self-Supply” shall mean Capacity Resources secured by a Load-Serving Entity, by ownership or contract, outside a Reliability Pricing Model Auction, and used to meet obligations under this Attachment or the Reliability Assurance Agreement through submission in a Base Residual Auction or an Incremental Auction of a Sell Offer indicating such Market Seller’s intent that such Capacity Resource be Self-Supply. Self-Supply may be either committed regardless of clearing price or submitted as a Sell Offer with a price bid. A Load Serving Entity’s Sell Offer with a price bid for an owned or contracted Capacity Resource shall not be deemed “Self-Supply,” unless it is designated as Self-Supply and used by the LSE to meet obligations under this Attachment or the Reliability Assurance Agreement.

### **2.65A Short-Term Resource Procurement Target**

“Short-Term Resource Procurement Target” shall mean, as to the PJM Region, for purposes of the Base Residual Auction, 2.5% of the PJM Region Reliability Requirement determined for such Base Residual Auction, for purposes of the First Incremental Auction, 2% of the of the PJM Region Reliability Requirement as calculated at the time of the Base Residual Auction; and, for purposes of the Second Incremental Auction, 1.5% of the of the PJM Region Reliability Requirement as calculated at the time of the Base Residual Auction; and, as to any Zone, an allocation of the PJM Region Short-Term Resource Procurement Target based on the Preliminary Zonal Forecast Peak Load, reduced by the amount of load served under the FRR Alternative. For any LDA, the LDA Short-Term Resource Procurement Target shall be the sum of the Short-Term Resource Procurement Targets of all Zones in the LDA.

### **2.65B Short-Term Resource Procurement Target Applicable Share**

“Short-Term Resource Procurement Target Applicable Share” shall mean: (i) for the PJM Region, as to the First and Second Incremental Auctions, 0.2 times the Short-Term Resource Procurement Target used in the Base Residual Auction and, as to the Third Incremental Auction for the PJM Region, 0.6 times such target; and (ii) for an LDA, as to the First and Second Incremental Auctions, 0.2 times the Short-Term Resource Procurement Target used in the Base Residual Auction for such LDA and, as to the Third Incremental Auction, 0.6 times such target.

## **2.66 Third Incremental Auction**

“Third Incremental Auction” shall mean an Incremental Auction conducted three months before the Delivery Year to which it relates.

## **2.67 [Reserved for Future Use]**

## **2.68 Unconstrained LDA Group**

“Unconstrained LDA Group” shall mean a combined group of LDAs that form an electrically contiguous area and for which a separate Variable Resource Requirement Curve has not been established under Section 5.10 of Attachment DD. Any LDA for which a separate Variable Resource Requirement Curve has not been established under Section 5.10 of Attachment DD shall be combined with all other such LDAs that form an electrically contiguous area.

## **2.69 Unforced Capacity**

“Unforced Capacity” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.69A Updated VRR Curve**

“Updated VRR Curve” shall mean the Variable Resource Requirement Curve as defined in section 5.10(a) of this Attachment for use in the Base Residual Auction of the relevant Delivery Year, updated to reflect the Short-term Resource Procurement Target applicable to the relevant Incremental Auction and any change in the Reliability Requirement from the Base Residual Auction to such Incremental Auction.

### **2.69B Updated VRR Curve Increment**

“Updated VRR Curve Increment” shall mean the portion of the Updated VRR Curve to the right of a vertical line at the level of Unforced Capacity on the x-axis of such curve equal to the net Unforced Capacity committed to the PJM Region as a result of all prior auctions conducted for such Delivery Year.

### **2.69C Updated VRR Curve Decrement**

“Updated VRR Curve Decrement” shall mean the portion of the Updated VRR Curve to the left of a vertical line at the level of Unforced Capacity on the x-axis of such curve equal to the net Unforced Capacity committed to the PJM Region as a result of all prior auctions conducted for such Delivery Year.

## **2.70 Variable Resource Requirement Curve**

“Variable Resource Requirement Curve” shall mean a series of maximum prices that can be cleared in a Base Residual Auction for Unforced Capacity, corresponding to a series of varying resource requirements based on varying installed reserve margins, as determined by the Office of the Interconnection for the PJM Region and for certain Locational Deliverability Areas in accordance with the methodology provided in Section 5.

## **2.71 Zonal Capacity Price**

“Zonal Capacity Price” shall mean the clearing price required in each Zone to meet the demand for Unforced Capacity and satisfy Locational Deliverability Requirements for the LDA or LDAs associated with such Zone. If the Zone contains multiple LDAs with different Capacity Resource Clearing Prices, the Zonal Capacity Price shall be a weighted average of the Capacity Resource Clearing Prices for such LDAs, weighted by the Unforced Capacity of Capacity Resources cleared in each such LDA.

**Attachment C**  
**Clean Tariff Changes**

## **2. DEFINITIONS**

Definitions specific to this Attachment are set forth below. In addition, any capitalized terms used in this Attachment not defined herein shall have the meaning given to such terms elsewhere in this Tariff or in the RAA. References to section numbers in this Attachment DD refer to sections of this attachment, unless otherwise specified.

### **2.1A Annual Demand Resource**

“Annual Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.1B Annual Resource**

“Annual Resource” shall mean a Generation Capacity Resource, an Energy Efficiency Resource or an Annual Demand Resource.

### **2.1C Annual Resource Price Adder**

“Annual Resource Price Adder” shall mean an addition to the marginal value of Unforced Capacity and the Extended Summer Resource Price Adder as necessary to reflect the price of Annual Resources required to meet the applicable Minimum Annual Resource Requirement.

### **2.1D Annual Revenue Rate**

“Annual Revenue Rate” shall mean the rate employed to assess a compliance penalty charge on a Demand Resource Provider or ILR Provider under section 11.

## **2.2 Avoidable Cost Rate**

“Avoidable Cost Rate” shall mean a component of the Market Seller Offer Cap calculated in accordance with section 6.

## **2.3 Base Load Generation Resource**

“Base Load Generation Resource” shall mean a Generation Capacity Resource that operates at least 90 percent of the hours that it is available to operate, as determined by the Office of the Interconnection in accordance with the PJM Manuals.

## **2.4 Base Offer Segment**

“Base Offer Segment” shall mean a component of a Sell Offer based on an existing Generation Capacity Resource, equal to the Unforced Capacity of such resource, as determined in accordance with the PJM Manuals. If the Sell Offers of multiple Market Sellers are based on a single existing Generation Capacity Resource, the Base Offer Segments of such Market Sellers

shall be determined pro rata based on their entitlements to Unforced Capacity from such resource.

## **2.5 Base Residual Auction**

“Base Residual Auction” shall mean the auction conducted three years prior to the start of the Delivery Year to secure commitments from Capacity Resources as necessary to satisfy any portion of the Unforced Capacity Obligation of the PJM Region not satisfied through Self-Supply.

## **2.6 Buy Bid**

“Buy Bid” shall mean a bid to buy Capacity Resources in any Incremental Auction.

## **2.7 Capacity Credit**

“Capacity Credit” shall have the meaning specified in Schedule 11 of the Operating Agreement, including Capacity Credits obtained prior to the termination of such Schedule applicable to periods after the termination of such Schedule.

## **2.8 Capacity Emergency Transfer Limit**

“Capacity Emergency Transfer Limit” or “CETL” shall have the meaning provided in the Reliability Assurance Agreement.

## **2.9 Capacity Emergency Transfer Objective**

“Capacity Emergency Transfer Objective” or “CETO” shall have the meaning provided in the Reliability Assurance Agreement.

## **2.9A Capacity Export Transmission Customer**

“Capacity Export Transmission Customer” shall mean a customer taking point to point transmission service under Part II of this Tariff to export capacity from a generation resource located in the PJM Region that is delisted from Capacity Resource status as described in section 5.6.6(d).

## **2.10 Capacity Market Buyer**

“Capacity Market Buyer” shall mean a Member that submits bids to buy Capacity Resources in any Incremental Auction.

## **2.11 Capacity Market Seller**

“Capacity Market Seller” shall mean a Member that owns, or has the contractual authority to control the output or load reduction capability of, a Capacity Resource, that has not transferred

such authority to another entity, and that offers such resource in the Base Residual Auction or an Incremental Auction.

## **2.12 Capacity Resource**

“Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.13 Capacity Resource Clearing Price**

“Capacity Resource Clearing Price” shall mean the price calculated for a Capacity Resource that offered and cleared in a Base Residual Auction or Incremental Auction, in accordance with Section 5.

## **2.14 Capacity Transfer Right**

“Capacity Transfer Right” shall mean a right, allocated to LSEs serving load in a Locational Deliverability Area, to receive payments, based on the transmission import capability into such Locational Deliverability Area, that offset, in whole or in part, the charges attributable to the Locational Price Adder, if any, included in the Zonal Capacity Price calculated for a Locational Delivery Area.

### **2.14A Conditional Incremental Auction**

“Conditional Incremental Auction” shall mean an Incremental Auction conducted for a Delivery Year if and when necessary to secure commitments of additional capacity to address reliability criteria violations arising from the delay in a Backbone Transmission upgrade that was modeled in the Base Residual Auction for such Delivery Year.

## **2.15 CONE Area**

“CONE Area” shall mean the areas listed in section 5.10(a)(iv)(A) and any LDAs established as CONE Areas pursuant to section 5.10(a)(iv)(B).

## **2.16 Cost of New Entry**

“Cost of New Entry” or “CONE” shall mean the nominal levelized cost of a Reference Resource, as determined in accordance with section 5.

### **2.16A Credit-Limited Offer**

“Credit-Limited Offer” shall have the meaning provided in Attachment Q to this Tariff.

## **2.17 Daily Deficiency Rate**

“Daily Deficiency Rate” shall mean the rate employed to assess certain deficiency charges under sections 7, 8, 9, or 13.



## **2.18 Daily Unforced Capacity Obligation**

“Daily Unforced Capacity Obligation” shall mean the capacity obligation of a Load Serving Entity during the Delivery Year, determined in accordance with Schedule 8 of the Reliability Assurance Agreement.

## **2.19 Delivery Year**

Delivery Year shall mean the Planning Period for which a Capacity Resource is committed pursuant to the auction procedures specified in Section 5.

## **2.20 Demand Resource**

“Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.21 Demand Resource Factor**

“Demand Resource Factor” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.22 Demand Resource Provider**

“Demand Resource Provider” shall mean a PJM Member that has the capability to reduce load, or that aggregates customers capable of reducing load. The Demand Resource Provider shall notify the Office of the Interconnection whether such load reduction is provided by a Limited Demand Resource, Extended Summer Demand Resource or an Annual Demand Resource. A Curtailment Service Provider, as defined in the Operating Agreement, may be a Demand Resource Provider, provided it qualifies its load reduction capability as a Limited Demand Resource, Extended Summer Demand Resource, or Annual Demand Resource.

## **2.23 EFORD**

“EFORD” shall have the meaning specified in the PJM Reliability Assurance Agreement.

## **2.24 Energy Efficiency Resource**

“Energy Efficiency Resource” shall have the meaning specified in the PJM Reliability Assurance Agreement.

## **2.24A Extended Summer Demand Resource**

“Extended Summer Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

## **2.24B Extended Summer Resource Price Adder**

“Extended Summer Resource Price Adder” shall mean an addition to the marginal value of Unforced Capacity as necessary to reflect the price of Annual Resources and Extended Summer Demand Resources required to meet the applicable Minimum Extended Summer Resource Requirement.

### **2.24C Extended Summer Demand Resource Reliability Target**

“Extended Summer Demand Resource Reliability Target” for the PJM Region or an LDA, shall mean the maximum amount of the combination of Extended Summer Demand Resources and Limited Demand Resources in Unforced Capacity determined by PJM to be consistent with the maintenance of reliability, stated in Unforced Capacity, that shall be used to calculate the Minimum Annual Resource Requirement. As more fully set forth in the PJM Manuals, PJM calculates the Extended Summer DR Reliability Target, by first determining a reference annual loss of load expectation (“LOLE”) assuming no Demand Resources. The calculation for the unconstrained portion of the PJM Region uses a daily distribution of loads under a range of weather scenarios (based on the most recent load forecast and iteratively shifting the load distributions to result in the Installed Reserve Margin established for the Delivery Year in question) and a weekly capacity distribution (based on the cumulative capacity availability distributions developed for the Installed Reserve Margin study for the Delivery Year in question). The calculation for each relevant LDA uses a daily distribution of loads under a range of weather scenarios (based on the most recent load forecast for the Delivery Year in question) and a weekly capacity distribution (based on the cumulative capacity availability distributions developed for the Capacity Emergency Transfer Objective study for the Delivery Year in question). For the relevant LDA calculation, the weekly capacity distributions are adjusted to reflect the Capacity Emergency Transfer Limit for the Delivery Year in question.

For both the PJM Region and LDA analyses, PJM then models the commitment of varying amounts of DR (displacing otherwise committed generation) as interruptible from May 1 through October 31 and unavailable from November 1 through April 30 and calculates the LOLE at each DR level. The Extended Summer DR Reliability Target is the DR amount, stated as a percentage of the unrestricted peak load, that produces no more than a ten percent increase in the LOLE, compared to the reference value. The Extended Summer Demand Resource Reliability Target shall be expressed as a percentage of the forecasted peak load of the PJM Region or such LDA and is converted to Unforced Capacity by multiplying [the reliability target percentage] times [the Forecast Pool Requirement] times [the DR Factor] times [the forecasted peak load of the PJM Region or such LDA, reduced by the amount of load served under the FRR Alternative].

### **2.25 [Reserved]**

### **2.26 Final RTO Unforced Capacity Obligation**

“Final RTO Unforced Capacity Obligation” shall mean the capacity obligation for the PJM Region, determined in accordance with Schedule 8 of the Reliability Assurance Agreement.

### **2.26A Final Zonal ILR Price**

“Final Zonal ILR Price” shall mean the Adjusted Zonal Capacity Price after the Second Incremental Auction, less the amount paid in CTR credits per MW of load in the Zone in which the ILR is to be certified.

### **2.27 First Incremental Auction**

“First Incremental Auction” shall mean an Incremental Auction conducted 20 months prior to the start of the Delivery Year to which it relates.

### **2.28 Forecast Pool Requirement**

“Forecast Pool Requirement” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.29 Forecast RTO ILR Obligation**

“Forecast RTO ILR Obligation” shall mean, in unforced capacity terms, the ILR Forecast for the PJM Region times the DR Factor, times the Forecast Pool Requirement, less the Unforced Capacity of all Demand Resources committed in FRR Capacity Plans by all FRR Entities in the PJM Region, for use in Delivery Years through May 31, 2012.

### **2.30 Forecast Zonal ILR Obligation**

“Forecast Zonal ILR Obligation” shall mean, in unforced capacity terms, the ILR Forecast for the Zone times the DR Factor, times the Forecast Pool Requirement, less the Unforced Capacity of all Demand Resources committed in FRR Capacity Plans by all FRR Entities in such Zone, for use in Delivery Years through May 31, 2012.

### **2.31 Generation Capacity Resource**

“Generation Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.32 ILR Forecast**

“ILR Forecast” shall mean, for any Delivery Year ending on or before May 31, 2012, the average annual megawatt quantity of ILR certified for the five Planning Periods preceding the date of the forecast; provided, however, that before such data becomes available for five Delivery Years under the Reliability Pricing Model, comparable data on Active Load Management (as defined in the preexisting reliability assurance agreements) from up to five prior Planning Periods shall be substituted as necessary; and provided further that, for transmission zones that were integrated into the PJM Region less than five years prior to the conduct of the Base Residual Auction for the Delivery Year, data on incremental load subject to mandatory interruption by Electric Distribution Companies within such zones shall be substituted as necessary.

### **2.33 ILR Provider**

“ILR Provider” shall mean a Member that has the capability to reduce load, or that aggregates customers capable of reducing load. A Curtailment Service Provider, as such term is defined in the PJM Operating Agreement, may be an ILR Provider, provided it obtains certification of its load reduction capability as ILR.

### **2.34 Incremental Auction**

“Incremental Auction” shall mean any of several auctions conducted for a Delivery Year after the Base Residual Auction for such Delivery Year and before the first day of such Delivery Year, including the First Incremental Auction, Second Incremental Auction, Third Incremental Auction or Conditional Incremental Auction. Incremental Auctions (other than the Conditional Incremental Auction), shall be held for the purposes of:

(i) allowing Market Sellers that committed Capacity Resources in the Base Residual Auction for a Delivery Year, which subsequently are determined to be unavailable to deliver the committed Unforced Capacity in such Delivery Year (due 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) to submit Buy Bids for replacement Capacity Resources; and

(ii) allowing the Office of the Interconnection to reduce or increase the amount of committed capacity secured in prior auctions for such Delivery Year if, as a result of changed circumstances or expectations since the prior auction(s), there is, respectively, a significant excess or significant deficit of committed capacity for such Delivery Year, for the PJM Region or for an LDA.

### **2.35 Incremental Capacity Transfer Right**

“Incremental Capacity Transfer Right” shall mean a Capacity Transfer Right allocated to a Generation Interconnection Customer or Transmission Interconnection Customer obligated to fund a transmission facility or upgrade, to the extent such upgrade or facility increases the transmission import capability into a Locational Deliverability Area, or a Capacity Transfer Right allocated to a Responsible Customer in accordance with Schedule 12A of the Tariff.

### **2.36 Interruptible Load for Reliability (ILR)**

“Interruptible Load for Reliability” or “ILR” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.36A Limited Demand Resource**

“Limited Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.36B Limited Demand Resource Reliability Target**

“Limited Demand Resource Reliability Target” for the PJM Region or an LDA, shall mean the maximum amount of Limited Demand Resources determined by PJM to be consistent with the maintenance of reliability, stated in Unforced Capacity that shall be used to calculate the Minimum Extended Summer Demand Resource Requirement for the PJM Region or such LDA. As more fully set forth in the PJM Manuals, PJM calculates the Limited Demand Resource Reliability Target by first: i) testing the effects of the ten-interruption requirement by comparing possible loads on peak days under a range of weather conditions (from the daily load forecast distributions for the Delivery Year in question) against possible generation capacity on such days under a range of conditions (using the cumulative capacity distributions employed in the Installed Reserve Margin study for the PJM Region and in the Capacity Emergency Transfer Objective study for the relevant LDAs for such Delivery Year) and, by varying the assumed amounts of DR that is committed and displaces committed generation, determines the DR penetration level at which there is a ninety percent probability that DR will not be called (based on the applicable operating reserve margin for the PJM Region and for the relevant LDAs) more than ten times over those peak days; ii) testing the six-hour duration requirement by calculating the MW difference between the highest hourly unrestricted peak load and seventh highest hourly unrestricted peak load on certain high peak load days (e.g., the annual peak, loads above the weather normalized peak, or days where load management was called) in recent years, then dividing those loads by the forecast peak for those years and averaging the result; and (iii) (for the 2016-2017 and subsequent Delivery Years) testing the effects of the six-hour duration requirement by comparing possible hourly loads on peak days under a range of weather conditions (from the daily load forecast distributions for the Delivery Year in question) against possible generation capacity on such days under a range of conditions (using a Monte Carlo model of hourly capacity levels that is consistent with the capacity model employed in the Installed Reserve Margin study for the PJM Region and in the Capacity Emergency Transfer Objective study for the relevant LDAs for such Delivery Year) and, by varying the assumed amounts of DR that is committed and displaces committed generation, determines the DR penetration level at which there is a ninety percent probability that DR will not be called (based on the applicable operating reserve margin for the PJM Region and for the relevant LDAs) for more than six hours over any one or more of the tested peak days. Second, PJM adopts the lowest result from these three tests as the Limited Demand Resource Reliability Target. The Limited Demand Resource Reliability Target shall be expressed as a percentage of the forecasted peak load of the PJM Region or such LDA and is converted to Unforced Capacity by multiplying [the reliability target percentage] times [the Forecast Pool Requirement] times [the DR Factor] times [the forecasted peak load of the PJM Region or such LDA, reduced by the amount of load served under the FRR Alternative].

### **2.37 Load Serving Entity (LSE)**

“Load Serving Entity” or “LSE” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.38 Locational Deliverability Area (LDA)**

“Locational Deliverability Area” or “LDA” shall mean a geographic area within the PJM Region that has limited transmission capability to import capacity to satisfy such area’s reliability requirement, as determined by the Office of the Interconnection in connection with preparation of the Regional Transmission Expansion Plan, and as specified in Schedule 10.1 of the Reliability Assurance Agreement.

### **2.39 Locational Deliverability Area Reliability Requirement**

“Locational Deliverability Area Reliability Requirement” shall mean the projected internal capacity in the Locational Deliverability Area plus the Capacity Emergency Transfer Objective for the Delivery Year, as determined by the Office of the Interconnection in connection with preparation of the Regional Transmission Expansion Plan, less the minimum internal resources required for all FRR Entities in such Locational Deliverability Area, and less any necessary adjustment for Price Responsive Demand proposed in a PRD Plan or committed following an RPM Auction for the Zones comprising such Locational Deliverability Area for such Delivery Year.

### **2.40 Locational Price Adder**

“Locational Price Adder” shall mean an addition to the marginal value of Unforced Capacity within an LDA as necessary to reflect the price of Capacity Resources required to relieve applicable binding locational constraints.

### **2.41 Locational Reliability Charge**

“Locational Reliability Charge” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.41A Locational UCAP**

“Locational UCAP” shall mean unforced capacity that a Member with available uncommitted capacity sells in a bilateral transaction to a Member that previously committed capacity through an RPM Auction but now requires replacement capacity to fulfill its RPM Auction commitment. The Locational UCAP Seller retains responsibility for performance of the resource providing such replacement capacity.

#### **2.41B Locational UCAP Seller**

“Locational UCAP Seller” shall mean a Member that sells Locational UCAP.

#### **2.41C Market Seller Offer Cap**

“Market Seller Offer Cap” shall mean a maximum offer price applicable to certain Market Sellers under certain conditions, as determined in accordance with section 6 of Attachment DD and section II.E of Attachment M - Appendix.

#### **2.41D Minimum Annual Resource Requirement**

“Minimum Annual Resource Requirement” shall mean the minimum amount of capacity that PJM will seek to procure from Annual Resources for the PJM Region and for each Locational Deliverability Area for which the Office of the Interconnection is required under section 5.10(a) of this Attachment DD to establish a separate VRR Curve for such Delivery Year. For the PJM Region, the Minimum Annual Resource Requirement shall be equal to the RTO Reliability Requirement minus [the Extended Summer Demand Resource Reliability Target for the RTO in Unforced Capacity]. For an LDA, the Minimum Annual Resource Requirement shall be equal to the LDA Reliability Requirement minus [the LDA CETL] minus [the Extended Summer Demand Resource Reliability Target for such LDA in Unforced Capacity]. The LDA CETL may be adjusted pro rata for the amount of load served under the FRR Alternative.

#### **2.41E Minimum Extended Summer Resource Requirement**

“Minimum Extended Summer Resource Requirement” shall mean the minimum amount of capacity that PJM will seek to procure from Extended Summer Demand Resources and Annual Resources for the PJM Region and for each Locational Deliverability Area for which the Office of the Interconnection is required under section 5.10(a) of this Attachment DD to establish a separate VRR Curve for such Delivery Year. For the PJM Region, the Minimum Extended Summer Resource Requirement shall be equal to the RTO Reliability Requirement minus [the Limited Demand Resource Reliability Target for the PJM Region in Unforced Capacity]. For an LDA, the Minimum Extended Summer Resource Requirement shall be equal to the LDA Reliability Requirement minus [the LDA CETL] minus [the Limited Demand Resource Reliability Target for such LDA in Unforced Capacity]. The LDA CETL may be adjusted pro rata for the amount of load served under the FRR Alternative.

#### **2.42 Net Cost of New Entry**

“Net Cost of New Entry” shall mean the Cost of New Entry minus the Net Energy and Ancillary Service Revenue Offset, as defined in Section 5.

#### **2.43 Nominated Demand Resource Value**

“Nominated Demand Resource Value” shall mean the amount of load reduction that a Demand Resource commits to provide either through direct load control, firm service level or guaranteed load drop programs. For existing Demand Resources, the maximum Nominated Demand Resource Value is limited, in accordance with the PJM Manuals, to the value appropriate for the method by which the load reduction would be accomplished, at the time the Base Residual Auction or Incremental Auction is being conducted.

#### **2.43A Nominated Energy Efficiency Value**

“Nominated Energy Efficiency Value” shall mean the amount of load reduction that an Energy Efficiency Resource commits to provide through installation of more efficient devices or equipment or implementation of more efficient processes or systems.

#### **2.44 Nominated ILR Value**

“Nominated ILR Value” shall mean the amount of load reduction that an ILR resource commits to provide either through direct load control, firm service level or guaranteed load drop programs. For ILR, the maximum Nominated ILR Capacity Value is limited, in accordance with the PJM Manuals, to the value appropriate for the method by which the load reduction would be accomplished, at the time the ILR is certified.

#### **2.45 Opportunity Cost**

“Opportunity Cost” shall mean a component of the Market Seller Offer Cap calculated in accordance with section 6.

#### **2.46 Peak-Hour Dispatch**

“Peak-Hour Dispatch” shall mean, for purposes of calculating the Energy and Ancillary Services Revenue Offset under section 5 of this Attachment, an assumption, as more fully set forth in the PJM Manuals, that the Reference Resource is committed in the Day-Ahead Energy Market in four distinct blocks of four hours of continuous output for each block from the peak-hour period beginning with the hour ending 0800 EPT through to the hour ending 2300 EPT for any day when the average day-ahead LMP for the area for which the Net Cost of New Entry is being determined is greater than, or equal to, the cost to generate (including the cost for a complete start and shutdown cycle) for at least two hours during each four-hour block, where such blocks shall be assumed to be committed independently; provided that, if there are not at least two economic hours in any given four-hour block, then the Reference Resource shall be assumed not to be committed for such block; and to the extent not committed in any such block in the Day-Ahead Energy Market under the above conditions based on Day-Ahead LMPs, is dispatched in the Real-Time Energy Market for such block if the Real-Time LMP is greater than or equal to the cost to generate under the same conditions as described above for the Day-Ahead Energy Market.

#### **2.47 Peak Season**

“Peak Season” shall mean the weeks containing the 24th through 36th Wednesdays of the calendar year. Each such week shall begin on a Monday and end on the following Sunday, except for the week containing the 36th Wednesday, which shall end on the following Friday.

#### **2.48 Percentage Internal Resources Required**

“Percentage Internal Resources Required” shall have the meaning specified in the Reliability Assurance Agreement.



#### **2.49 Planned Demand Resource**

“Planned Demand Resource” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.50 Planned External Generation Capacity Resource**

“Planned External Generation Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.50A Planned Generation Capacity Resource**

“Planned Generation Capacity Resource” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.51 Planning Period**

“Planning Period” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.52 PJM Region**

“PJM Region” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.53 PJM Region Installed Reserve Margin**

“PJM Region Installed Reserve Margin” shall have the meaning specified in the Reliability Assurance Agreement.

#### **2.54 PJM Region Peak Load Forecast**

“PJM Region Peak Load Forecast” shall mean the peak load forecast used by the Office of the Interconnection in determining the PJM Region Reliability Requirement, and shall be determined on both a preliminary and final basis as set forth in section 5.

#### **2.55 PJM Region Reliability Requirement**

“PJM Region Reliability Requirement” shall mean, for purposes of the Base Residual Auction, the Forecast Pool Requirement multiplied by the Preliminary PJM Region Peak Load Forecast, less the sum of all Preliminary Unforced Capacity Obligations of FRR Entities in the PJM Region; and, for purposes of the Incremental Auctions, the Forecast Pool Requirement multiplied by the updated PJM Region Peak Load Forecast, less the sum of all updated Unforced Capacity Obligations of FRR Entities in the PJM Region, and less any necessary adjustment for Price Responsive Demand proposed in a PRD Plan or committed following an RPM Auction (as applicable) for such Delivery Year.

#### **2.56 Projected PJM Market Revenues**

“Projected PJM Market Revenues” shall mean a component of the Market Seller Offer Cap calculated in accordance with section 6.

### **2.57 Qualifying Transmission Upgrade**

“Qualifying Transmission Upgrade” shall mean a proposed enhancement or addition to the Transmission System that: (a) will increase the Capacity Emergency Transfer Limit into an LDA by a megawatt quantity certified by the Office of the Interconnection; (b) the Office of the Interconnection has determined will be in service on or before the commencement of the first Delivery Year for which such upgrade is the subject of a Sell Offer in the Base Residual Auction; (c) is the subject of a Facilities Study Agreement executed before the conduct of the Base Residual Auction for such Delivery Year and (d) a New Service Customer is obligated to fund through a rate or charge specific to such facility or upgrade.

### **2.58 Reference Resource**

“Reference Resource” shall mean a combustion turbine generating station, configured with two General Electric Frame 7FA turbines with inlet air cooling to 50 degrees, Selective Catalytic Reduction technology in CONE Areas 1, 2, 3, and 4, dual fuel capability, and a heat rate of 10.096 Mmbtu/ MWh.

### **2.59 Reliability Assurance Agreement**

“Reliability Assurance Agreement” shall mean that certain “Reliability Assurance Agreement Among Load-Serving Entities in the PJM Region,” on file with FERC as PJM Interconnection, L.L.C. Rate Schedule FERC No.44.

### **2.60 Reliability Pricing Model Auction**

“Reliability Pricing Model Auction” or “RPM Auction” shall mean the Base Residual Auction or any Incremental Auction.

### **2.61 Resource Substitution Charge**

“Resource Substitution Charge” shall mean a charge assessed on Capacity Market Buyers in an Incremental Auction to recover the cost of replacement Capacity Resources.

### **2.61A Scheduled Incremental Auctions**

“Scheduled Incremental Auctions” shall refer to the First, Second, or Third Incremental Auction.

### **2.62 Second Incremental Auction**

“Second Incremental Auction” shall mean an Incremental Auction conducted ten months before the Delivery Year to which it relates.

## **2.63 Sell Offer**

“Sell Offer” shall mean an offer to sell Capacity Resources in a Base Residual Auction, Incremental Auction, or Reliability Backstop Auction.

## **2.64 [Reserved for Future Use]**

## **2.65 Self-Supply**

“Self-Supply” shall mean Capacity Resources secured by a Load-Serving Entity, by ownership or contract, outside a Reliability Pricing Model Auction, and used to meet obligations under this Attachment or the Reliability Assurance Agreement through submission in a Base Residual Auction or an Incremental Auction of a Sell Offer indicating such Market Seller’s intent that such Capacity Resource be Self-Supply. Self-Supply may be either committed regardless of clearing price or submitted as a Sell Offer with a price bid. A Load Serving Entity’s Sell Offer with a price bid for an owned or contracted Capacity Resource shall not be deemed “Self-Supply,” unless it is designated as Self-Supply and used by the LSE to meet obligations under this Attachment or the Reliability Assurance Agreement.

### **2.65A Short-Term Resource Procurement Target**

“Short-Term Resource Procurement Target” shall mean, as to the PJM Region, for purposes of the Base Residual Auction, 2.5% of the PJM Region Reliability Requirement determined for such Base Residual Auction, for purposes of the First Incremental Auction, 2% of the of the PJM Region Reliability Requirement as calculated at the time of the Base Residual Auction; and, for purposes of the Second Incremental Auction, 1.5% of the of the PJM Region Reliability Requirement as calculated at the time of the Base Residual Auction; and, as to any Zone, an allocation of the PJM Region Short-Term Resource Procurement Target based on the Preliminary Zonal Forecast Peak Load, reduced by the amount of load served under the FRR Alternative. For any LDA, the LDA Short-Term Resource Procurement Target shall be the sum of the Short-Term Resource Procurement Targets of all Zones in the LDA.

### **2.65B Short-Term Resource Procurement Target Applicable Share**

“Short-Term Resource Procurement Target Applicable Share” shall mean: (i) for the PJM Region, as to the First and Second Incremental Auctions, 0.2 times the Short-Term Resource Procurement Target used in the Base Residual Auction and, as to the Third Incremental Auction for the PJM Region, 0.6 times such target; and (ii) for an LDA, as to the First and Second Incremental Auctions, 0.2 times the Short-Term Resource Procurement Target used in the Base Residual Auction for such LDA and, as to the Third Incremental Auction, 0.6 times such target.

## **2.66 Third Incremental Auction**

“Third Incremental Auction” shall mean an Incremental Auction conducted three months before the Delivery Year to which it relates.

## **2.67 [Reserved for Future Use]**

## **2.68 Unconstrained LDA Group**

“Unconstrained LDA Group” shall mean a combined group of LDAs that form an electrically contiguous area and for which a separate Variable Resource Requirement Curve has not been established under Section 5.10 of Attachment DD. Any LDA for which a separate Variable Resource Requirement Curve has not been established under Section 5.10 of Attachment DD shall be combined with all other such LDAs that form an electrically contiguous area.

## **2.69 Unforced Capacity**

“Unforced Capacity” shall have the meaning specified in the Reliability Assurance Agreement.

### **2.69A Updated VRR Curve**

“Updated VRR Curve” shall mean the Variable Resource Requirement Curve as defined in section 5.10(a) of this Attachment for use in the Base Residual Auction of the relevant Delivery Year, updated to reflect the Short-term Resource Procurement Target applicable to the relevant Incremental Auction and any change in the Reliability Requirement from the Base Residual Auction to such Incremental Auction.

### **2.69B Updated VRR Curve Increment**

“Updated VRR Curve Increment” shall mean the portion of the Updated VRR Curve to the right of a vertical line at the level of Unforced Capacity on the x-axis of such curve equal to the net Unforced Capacity committed to the PJM Region as a result of all prior auctions conducted for such Delivery Year.

### **2.69C Updated VRR Curve Decrement**

“Updated VRR Curve Decrement” shall mean the portion of the Updated VRR Curve to the left of a vertical line at the level of Unforced Capacity on the x-axis of such curve equal to the net Unforced Capacity committed to the PJM Region as a result of all prior auctions conducted for such Delivery Year.

## **2.70 Variable Resource Requirement Curve**

“Variable Resource Requirement Curve” shall mean a series of maximum prices that can be cleared in a Base Residual Auction for Unforced Capacity, corresponding to a series of varying resource requirements based on varying installed reserve margins, as determined by the Office of the Interconnection for the PJM Region and for certain Locational Deliverability Areas in accordance with the methodology provided in Section 5.

## **2.71 Zonal Capacity Price**

“Zonal Capacity Price” shall mean the clearing price required in each Zone to meet the demand for Unforced Capacity and satisfy Locational Deliverability Requirements for the LDA or LDAs associated with such Zone. If the Zone contains multiple LDAs with different Capacity Resource Clearing Prices, the Zonal Capacity Price shall be a weighted average of the Capacity Resource Clearing Prices for such LDAs, weighted by the Unforced Capacity of Capacity Resources cleared in each such LDA.