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January 23, 2017

Via Electronic Filing

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. ER17-367-001

Dear Secretary Bose:

PJM Interconnection, L.L.C. ("PJM"), pursuant to the Commission's December 23, 2016 letter requesting additional information in this proceeding,[1] encloses its written responses to the questions listed in the letter. These responses concern PJM's November 17, 2016 filing of revisions under section 205 of the Federal Power Act, 16 U.S.C. § 824d, to the PJM Open Access Transmission Tariff ("Tariff") and the Reliability Assurance Agreement among Load Serving Entities in the PJM Region ("RAA") to (1) enhance its aggregation rules to provide additional ways in which eligible resources can participate in RPM; (2) provide an opportunity for such eligible resources to obtain additional Capacity Interconnection Rights ("CIRs")[2] for the winter period to support aggregation; and (3) modify rules for measuring Demand Resource ("DR") performance during the winter period.[3]

As PJM explained in its filing, PJM sought the changes to facilitate participation of resources in the May, 2017 Reliability Pricing Model ("RPM") Base Residual Auction ("BRA"), given that is the first Base Residual Auction in which all capacity offered and cleared must be from Capacity Performance Resources, as approved by the Commission in its orders on PJM's Capacity Performance filing.[4] Thus, in its initial filing, PJM requested an effective date of

[1] *PJM Interconnection, L.L.C.*, Docket No. ER17-367-000 (issued Dec. 23, 2016).

[2] Capitalized terms not otherwise defined herein have the meaning specified in, as applicable, the Tariff, the Amended and Restated Operating Agreement of PJM Interconnection, L.L.C. ("Operating Agreement"), or the RAA.

[3] *PJM Interconnection, L.L.C., Proposed Modifications For Enhanced Aggregation, Non-Summer Capacity Interconnection Rights, and Modified Demand Response Resource Measurement & Verification to Support Capacity Performance*, Docket No. ER17-367-000 (filed Nov. 16, 2017) ("Filing")

[4] *PJM Interconnection, L.L.C.*, 151 FERC ¶ 61,208 (2015) ("Capacity Performance Order"), *order on reh'g*, 155 FERC ¶ 61,157 (2016) ("Capacity Performance Rehearing Order") (collectively, "Capacity Performance Orders"), appeal pending, Nos. 16-1234, et al. (D.C. Cir. July 8, 2016).

January 19, 2017 for changes associated with the enhanced aggregation rules and winter CIRs, and an effective date of June 1, 2017 for PJM's proposed changes associated with Demand Resource Measurement & Verification ("DR M&V") to coincide with the start of the next Delivery Year on June 1, 2017.

Given the Commission's request for additional information, and the date of this response, PJM anticipates the Commission will issue an order on these market rule changes by no later than March 24, 2017.[5] PJM asks for the same effective dates previously requested. PJM is confident that, even with a March 24 (or earlier) order, there remains a reasonable amount of time for market participants to take advantage of the new rules prior to the commencement of the BRA on May 10, 2017. To the extent the Commission can rule earlier than March 24, that would afford market participants even more time, and PJM urges the Commission to do so, if practicable.

Respectfully submitted,

/s/ Jennifer H. Tribulski

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[5] The December 23, 2016 Letter directed PJM to include with this submittal at least one eTariff record, even if no tariff changes are otherwise required. In compliance with this requirement, PJM encloses Definitions – R-S of the PJM Open Access Transmission Tariff in.rtf format only as filed in the November 17, 2016 Filing. There are no changes in the Tariff revisions or their effective date from the November 17 Filing; therefore, this submittal does not include a PDF version of the Tariff changes. The enclosed tariff record retains the same effective date requested in the November 17, 2016 filing, i.e., January 19, 2017.

Response of PJM Interconnection, L.L.C. to
Commission's December 23, 2016 Information Request
Docket No. ER17-367-000
Dated January 23, 2017

(1) PJM proposes revisions to sections 5.12(a) and 5.12(b) of Attachment DD of its OATT, which sections describe the conduct of Reliability Pricing Model (RPM) auctions. The revisions describe a new constraint in the Base Residual Auction and Incremental Auction optimization algorithms that effectuate PJM's proposed design by clearing equal quantities, in megawatts, of Summer-Period Capacity Performance Resources and Winter-Period Capacity Performance Resources for the RTO.[6] However, the proposed OATT revisions appear unclear as to how PJM will determine which Seasonal Capacity Performance Resource offers clear an auction and which do not, and how PJM will ensure least-cost capacity procurement. The following questions address these issues:

a. Summer-Period Capacity Performance Resources and Winter-Period Capacity Performance Resources will individually submit offers with potentially different offer prices, in units of dollars per megawatt-day ($/MW-d). Please describe how PJM will aggregate the offers. Specifically, will PJM place the individual Seasonal Capacity Performance Resource Sell Offers into the applicable supply stack separately, or will PJM effectively pair each Seasonal Capacity Performance Resource with a complement and put each pair into the supply stack as a single offer at an offer price representing the combination of the constituent Seasonal Capacity Performance Resources? If the latter, how is the offer price calculated?

PJM Response:

PJM will place the individual Seasonal Capacity Performance Resource Sell Offers into the applicable supply stack separately. More specifically, all summer-season, winter-season, and annual offers will be considered simultaneously, and the algorithm will clear the set of resources that results in the least-cost solution that satisfies all applicable requirements and constraints, including a constraint that the total cleared MW quantity of Summer-Period CP Resources must equal the total cleared MW quantity of Winter-Period CP Resources. That constraint implements the fundamental purpose of this proposed aggregation, which is to accommodate seasonal resources within the newly-defined Capacity Performance paradigm.

b. PJM's proposed revision to section 5.14(b) of Attachment DD of the OATT states, "If the Sell Offer price of a cleared Seasonal Capacity Performance Resource exceeds the applicable Capacity Resource Clearing Price, the Capacity Market Seller shall receive a Resource Make-Whole Payment equal to the difference between the Sell Offer price and Capacity Resource Clearing Price in such RPM Auction."[7] Regardless of how Seasonal

[6] Proposed PJM OATT at Attachment DD, section 5.12(a)-(b).

[7] Proposed PJM OATT at Attachment DD, section 5.14(b).

Capacity Performance Resource offers appear in the supply stack, under what circumstances would the optimization algorithm clear an individual Seasonal Capacity Performance Resource whose offer price is greater than the applicable Capacity Resource Clearing Price? Put another way, how will the optimization algorithm compare Seasonal Capacity Performance Resources to annual Capacity Performance Resources, and at what pricing point will the optimization algorithm stop clearing Seasonal Capacity Performance Resources, aside from when there are no more resources of one season type in the supply stack? Please use specific examples to explain.

PJM Response:

The proposed optimization algorithm can clear an individual Seasonal CP Resource whose offer price is above the applicable Capacity Resource Clearing Price only when the algorithm clears such resource and an offsetting Seasonal CP Resource at an average offer price less than the clearing price. The effective cost of clearing matching quantities of winter and summer offers to create an annual CP Resource is the average of the winter and summer offer prices. The algorithm, therefore, will clear offsetting quantities of winter and summer offers based on the average price of those offsetting offers.

For example, a Summer-Period CP Resource and a Winter-Period CP Resource with an average offer of $100/MW-day will clear when the clearing price is greater than or equal to $100/MW-day, regardless of the individual offers submitted by the respective resources. In the most extreme scenario, one Seasonal CP Resource could offer in at $200/MW-day and another Seasonal CP Resource of the opposite season could offer $0/MW-day for an average of $100/MW-day and the resource would clear. Therefore, the optimization algorithm will stop clearing paired seasonal resources when the clearing price is less than the average offer price of the pair.

c. To the extent the optimization algorithm would clear individual Seasonal Capacity Performance Resources whose offer prices are greater than the applicable Capacity Resource Clearing Price, how is doing so consistent with the stated objective of the auction clearing algorithm "to calculate the overall clearing result to minimize the cost of satisfying the reliability requirements[.]"[8] The Independent Market Monitor suggests that auction clearing-related make-whole payments are not currently considered by the optimization algorithm under existing rules, and that the make-whole payments introduced by the proposed OATT revisions likewise would not be considered by the optimization algorithm.[9] Does PJM agree with the Independent Market Monitor on these points? If so, how will PJM meet the above-referenced cost minimization objective when clearing auctions?

[8] Proposed PJM OATT at Attachment DD, section 5.12(a).

[9] Independent Market Monitor Comments at 9-11.

PJM Response:

The RPM auction-clearing algorithm, similar to the auction algorithms PJM uses to clear the energy and other markets, defines the lowest-cost overall auction clearing result (i.e., the cost minimization objective as stated in the question) as the solution that yields the lowest *bid-based* cost of procuring capacity while satisfying all requirements and constraints. In the instance of Seasonal CP Resource aggregation, the *bid-based* cost of clearing offsetting seasonal resources is the average of their offer prices, because each offer is only for a half-year. That average price is the appropriate input (consistent with the current Tariff and the manner in which PJM clears its other markets) to determine the overall lowest-cost auction clearing result.

PJM's proposal raises distinct questions, however, outside the bid-based cost: (1) the existence of make whole payments to Capacity Market Sellers of cleared capacity with a half-year Sell Offer price above the Capacity Resource Clearing Price, and (2) who should bear the cost of such make-whole payments. As to the first question, the make-whole payments to seasonal resources arises in some circumstances because the allocation of capacity revenues to these resources is based on a 50/50 split of the total capacity market revenues even though the individual offers may be in a different ratio. Thus, for example, if each seasonal resource cleared 100 MW of capacity for six months of the year at a $100/MW-day, the combined resource would collect $10,000/day or $3.65M for the year. This is consistent with the revenues required to clear that resource based on the averaged, annual $100/MW-day offer price. The make whole arises when the revenues to the underlying seasonal resources are distributed. Because each resource is proposed to be allocated half of the revenues, both resources collect $100/MW-day for a six month period or, $1.825M for the year. This results in a revenue shortfall to the seasonal resource with a cleared offer higher than the clearing price.

As to the second question, under PJM's proposal, loads would bear the cost of that make-whole payment. This proposal is consistent with the existing make whole provisions and with "beneficiary pays" principles because loads ultimately benefit from minimizing the cost to procure capacity both prior to and after the implementation of seasonal aggregation. The allocation of these costs to loads does result in additional out-of-market capacity costs that loads are exposed to.

PJM emphasizes, however, that while the filed approach is just and reasonable for the reasons provided above, it is not the only possible reasonable approach. The origin of the make whole payments for seasonal resources is distinctly different than the existing make-whole that is caused by minimum block offers and therefore may require a different approach for allocation.

Some have noted that the PJM's approach could incent offers for the season that is in excess to be submitted below the cost and risk of accepting the commitment.[10] Requiring the lower-cost seasonal resource to pay the extra-marginal amount to the higher-cost seasonal resource as suggested by PSEG[11] could substantially blunt this incentive (to the extent it exists),

[10] *See, e.g.*, Protest of the PSEG Companies at 8-10 (Dec. 8, 2016) ("PSEG Protest").

[11] *Id.*

because the lower-cost resource would know that bidding too low could increase the make-whole payment it must pay, while the higher-cost resource would recognize lower-cost seasonal sellers' reluctance to offer too low, and therefore would not offer too high if it wanted to be certain that its offer would be offset and clear. The alternative of requiring the lower-price seasonal resource to bear the cost of the make-whole payment also spares loads the cost of this payment, and moots any need to consider the cost of such payments in identifying the least-cost clearing solution (which concerns the lowest cost *to loads*).

Assume, for example, that two Seasonal CP Resources were cleared for 100 MW with offers of $200/MW-day and $0/MW-day at a clearing price of $100/MW-day. This results in $3.65M of capacity revenues paid by loads to cover the costs of such resources. PJM's proposal distributed the $3.65M evenly across these two Seasonal CP Resources and then allocated the cost to make the Capacity Market Seller of the $200/MW-day offer whole to loads. The additional cost in this scenario is $1.825M (100 MW * $100/MW-day * 182.5 days). The PSEG proposal would allocate this cost to the corresponding seasonal resource in the aggregate and not to loads. The end result of this allocation is that the Capacity Market Seller of the offered $200/MW-day seasonal resource collects $200/MW-day, its offer price, and the Capacity Market Seller of the offered $0/MW-day seasonal resource collects $0/MW-day, its offer price. This methodology sends a strong incentive against underbidding and potential price suppression while not introducing additional costs to loads.

Should the Commission condition its acceptance of PJM's proposal on submitting a compliance filing to implement the PSEG proposal, PJM believes it could still implement this proposal in time of the upcoming BRA which commences on May 10, 2017, but PJM would need to include additional Tariff provisions to establish the process by which the seasonal make whole payments would be allocated to Seasonal CP Resources. PJM proposes to implement the allocation by totaling the seasonal make whole payments needed for extra-marginal Seasonal CP Resources for each constrained LDA and the RTO, and allocate those make whole payments to all infra-marginal Seasonal CP Resources of the opposite season that received the same clearing price on a pro-rata share based off the infra-marginal Seasonal CP Resource's profit, represented as the difference between its offer price and clearing price.

Ultimately, *who pays* the make-whole payment is a cost allocation issue, and thus "not a matter for the slide rule."[12] While one could argue that load benefits to the extent seasonal resources clear at an average cost below the alternative options, and thus should bear the make-whole cost, seasonal offers directly depend on opposite-season offers in order to clear at all. That undeniable benefit, along with considered judgment of which solution best avoids gaming concerns, could warrant requiring the lower-cost seasonal resource to bear the cost of the make-whole payment for the higher-cost resource.

[12] *Colorado Interstate Gas Co. v. FPC*, 324 U.S. 581, 589 (1945); *see also Midwest ISO Transmission Owners v. FERC*, 373 F.3d 1361, at 1369 (D.C. Cir. 2004) ("we have never required a ratemaking agency to allocate costs with exacting precision").

Finally, PJM notes that the issue raised by the IMM[13] is not whether PJM should consider the cost of existing make-whole payments in determining the least-cost solution, but instead concerns the precise steps PJM takes to make that determination. PJM currently makes that determination when assessing whether to clear minimum-block bids, as explicitly contemplated by the tariff.[14] The IMM explains that it has advocated that PJM incorporate an explicit variable in its algorithm to reflect the make-whole cost when evaluating minimum-block offers, and it is now extending its advocacy of that position to include make-whole payments for seasonal resources.

As PJM has stated previously, the make whole that can occur under the current construct for annual resources is different from what can occur under PJM's proposal in this proceeding. The current make whole is caused by minimum block bids on annual Capacity Resources that must be cleared up to a minimum level even when less capacity is needed to clear the market. Seasonal make whole payments are different. They occur because the Sell Offers for the two Seasonal CP Resources are effectively averaged to put them on like terms with Sell Offers of annual CP Resources even though the Sell Offer prices they may be different by season. When the optimization algorithm runs, it fully considers the total cost of the Seasonal CP offers the same way an annual offer's total cost is considered. Each offer segment's total cost (Cleared MW * Offer Price) is considered until the optimization algorithm can identify the lowest cost solution to meet the capacity needs. When this process is complete, the result is the lowest bid-based production cost available to meet the capacity needs of the system and the Capacity Resource Clearing Price is determined. During this process, the minimum block segment costs are included because they are part of the submitted Sell Offer prices. Seasonal offers have also been fully analyzed on the basis of how they are submitted to ensure the average annual cost of any pair is at or below the Capacity Resource Clearing Price. This solution represents the lowest cost to procure capacity based on the offers submitted.

PJM believes including the the make-whole costs related to Seasona CP Resources into the optimization algorithm is inappropriate. The total cost of each annual and Seasonal CP Resource offer is already considered in the optimization algorithm. Inclusion of make-whole payments to Seasonal CP Resources could have a chilling effect on their ability to clear by introducing additional costs above the Sell Offers they submitted. Any time the inclusion of these costs results in skipping a set of seasonal offers in lieu of something else, the solution has

[13] Comments of the Independent Market Monitor for PJM (Dec. 8, 2016).

[14] As required by Tariff, Attachment DD, section 5.12(a):

> In determining the lowest-cost overall clearing result that satisfies all applicable constraints and requirements, the optimization may select from among multiple possible alternative clearing results that satisfy such requirements, including, for example (without limitation by such example), accepting a lower-priced Sell Offer that intersects the Variable Resource Requirement Curve and that specifies a minimum capacity block, accepting a higher-priced Sell Offer that intersects the Variable Resource Requirement Curve and that contains no minimum-block limitations, or rejecting both of the above alternatives and clearing the auction at the higher-priced point on the Variable Resource Requirement Curve that corresponds to the Unforced Capacity provided by all Sell Offers located entirely below the Variable Resource Requirement Curve.

departed from the lowest bid-based production cost – a principle goal of virtually all market clearing engines.

Should the Commission find PJM's proposal is not just and reasonable, PJM believes the PSEG proposal is superior to the IMM suggested approach to resolving concerns regarding the make-whole payments to seasonal resources would be to adopt the PSEG proposal. This proposal directly addresses the Seasonal CP Resource make-whole payment issue by keeping it between the aggregated parties. It also aides in addressing the underbidding concerns raised by PSEG and others for seasonal resources that are in excess. Finally, this proposal should eliminate any desire to include make-whole payments to seasonal resources in the optimization algorithm because they would no longer be costs that loads are exposed to.

d. How will PJM break ties when multiple Seasonal Capacity Performance Resources submit identical offer prices? For example, suppose there are only four 10 MW Seasonal Capacity Performance Resource offers in Locational Deliverability Area (LDA) X. One offer is from a Winter-Period Capacity Performance Resource and three offers, all at $100/MW-d, are from Summer-Period Capacity Performance Resources. How will PJM determine which of the three Summer-Period Capacity Performance Resources will be selected as a complement to the Winter-Period Capacity Performance Resource to clear in LDA X?

PJM Response:

The existing provisions of Tariff, Attachment DD, section 5.12(d) describe the logic used to break ties of equal priced Sell Offers. In accordance with these provisions, the three Summer-Period CP Resources, all at $100/MW-day, would receive a pro-rata share of the 10 MW based on their Sell Offer MW quantities. Each Summer-Period CP Resource in this case has equal Sell Offer MW quantities of 10 MW, therefore the 10 MW quantity of cleared Winter-Period CP Resource would be allocated in equal one-third proportions to each Summer-Period CP Resource.

(2) Under PJM's proposal to permit clearing of commercially-aggregated and RPM-aggregated resources across LDAs, a Seasonal Capacity Performance Resource or a portion of a commercially-aggregated Capacity Performance Resource could clear an auction, be counted toward the reliability requirement of an LDA other than the lowest level LDA[15] in which it is located, and receive a Capacity Resource Clearing Price less than that of the lowest level LDA in which it is located. Does such an outcome risk sending inaccurate price signals for investment, particularly when the lowest level LDA has a Locational Price Adder?

PJM Response:

No, because a seasonal resource is not, by itself, a Capacity Resource that can satisfy PJM's reliability requirement. Price signals are intended to incent resources to meet capacity needs, and PJM capacity needs are quantified by PJM Region and LDA reliability requirements—all of which are *annual* capacity requirements. Cross-LDA aggregation creates *flexibility* for market participants, but that flexibility does not change the annual nature of PJM reliability requirements. Price signals will continue to work exactly as intended, encouraging development of resources *that can meet the reliability requirement* in the areas that, as shown by clearing prices, most need development of resources.

Thus, a Capacity Market Seller with a Summer-Period CP resource in one LDA will have the option to pursue Commercial Aggregation with a Winter-Period CP resource in another LDA. If they are successful, the resulting annual-equivalent resource will (if it clears) help satisfy the reliability requirement in any LDA in which both are located. The resources will then be compensated based on the smallest LDA (with a separate price) in which both components of the annual-equivalent resource are located, just as an annual CP resource is compensated based on the smallest LDA (with a separate price) in which that annual resource is located.

Importantly, *because seasonal resources can pursue commercial aggregation with opposite-season resources in any LDA*, RPM price signals will work as they always have. Annual resources will continue to be incented to invest in higher-price areas, and to consider retirement if clearing prices are too low to assure cost recovery for that resource. Similarly, seasonal resources will be incented to invest in, *and seek aggregation with opposite-season resources in*, higher-price LDAs. Price signals that incent this annual, or annual-equivalent investment and development, are thus operating as they always have, but will now accommodate the flexibility afforded resources to aggregate in separate LDAs.

Acting on these price signals, Capacity Market Sellers of seasonal resources located in higher-price LDAs will be encouraged to develop their own opposite-season resources in the same LDA, or to seek Commercial Aggregation with opposite season resources in the same

[15] We adopt here the terminology PJM uses in its transmittal letter to distinguish LDAs where one is nested within another. For example, the EMAAC LDA is nested within the MAAC LDA, so a resource located in EMAAC is also located in MAAC. In this example, EMAAC would be the "lowest level" LDA and MAAC would be the "higher level" LDA.

LDA. But even if they are not successful in that effort, they still can aggregate with opposite season resources in other LDAs, and receive compensation for the smallest LDA in which they form an annual-equivalent resource.

Seasonal resources also have another important ability to respond to price signals, i.e., locate in an area where they project Emergency Actions may be more likely, and collect any available Bonus Performance Payments by performing when such actions occur. Seasonal resources have no capacity must-offer requirement, so they can pursue a business strategy of sitting out the RPM auctions and thus maximizing the degree to which any performance they do provide during Performance Assessment Hours is considered Bonus Performance.

(3) The following questions relate to how charges for non-performance and credits for performance under section 10A of Attachment DD of PJM's OATT will apply if cross-LDA aggregation is permitted.

a. In describing the applicability of the Performance Shortfall calculation, existing section 10A(c) states that "[s]uch calculation shall encompass all resources located in the area defined by the Emergency Action[.]"[16] **If cross-LDA aggregation is permitted, this provision suggests that if a Performance Assessment Hour occurs *only* in LDA X, a Seasonal Capacity Performance Resource or a portion of a commercially-aggregated Capacity Performance Resource located in LDA X but which clears to meet the reliability requirement in LDA Y *will* be subject to the charges and credits of section 10A(c). This interpretation is also consistent with PJM's statement about commercially-aggregated resources in its transmittal letter: "[I]ndividual resources that comprise the commercially-aggregated resource will be expected to respond during a Performance Assessment Hour in the area in which such individual resource is physically located."**[17] **Is this interpretation correct with respect to both commercially-aggregated resources and Seasonal Capacity Performance Resources? If yes, how is such application appropriate when the Seasonal Capacity Performance Resource or portion of a commercially-aggregated Capacity Performance Resource is receiving the Capacity Resource Clearing Price for LDA Y and helping to meet the reliability requirement for LDA Y? If no, how does PJM propose to apply charges for non-performance and credits for performance in this situation?**

PJM Response:

The interpretation posed in the request is correct, and is appropriate because Non-Performance Charges *are not based* on Capacity Resource Clearing Prices. Non-Performance Charges, for seasonal resources or any other resources, are instead based on the Net Cost of New Entry for the LDA, which—for any resource—can bear little resemblance to the Capacity Resource Clearing Price that resource earned by clearing.

More specifically, any resource that is physically located in the area defined by an Emergency Action will be assessed performance for each Performance Assessment Hour ("PAH") associated with that Emergency Action and any resource with a capacity commitment during these PAHs will be subject to a Non-Performance Charge for any hour in which it under-performed. This is true for all CP Resources, regardless of whether the resource took on this capacity commitment as a stand-alone annual CP Resource, as a Seasonal CP Resource or as an underlying resource of a commercially-aggregated CP Resource. Each CP Resource with a capacity commitment is subject to a Non-Performance Charge based on the charge rate applicable to the LDA in which the CP Resource is physically located, again, regardless of how the capacity commitment was taken on by the resource. The Non-Performance Charge Rate of all CP Resources is based on the Net CONE of the LDA in which the CP Resource resides *and is*

[16] Proposed PJM OATT at Attachment DD, section 10A(c).

[17] PJM Transmittal Letter at 12.

entirely unrelated to the Capacity Resource Clearing Price applicable to the resource. The credits paid to over-performing resources for each PAH are not based on a prescribed rate; the total Non-Performance Charges collected for each PAH are allocated to over-performing resources based on each resources' share of the total over-performance MW quantity.

b. Proposed section 10A(e) states that "[f]or Capacity Performance Resources and Seasonal Capacity Performance Resources, the Non-Performance Charge Rate = (Net Cost of New Entry…*for the LDA* and Delivery Year for which such calculation is performed * (365/30))."[18]

i. In discussing commercially-aggregated resources, PJM's transmittal letter states that "[t]he Non-Performance Charge rate applicable to an under-performing aggregate resource is based on the rate associated with the LDA in which the under-performing underlying resources are located *weighted by the under-performance MW quantity of such resources*."[19] For a commercially-aggregated resource whose constituent parts are located in different LDAs with different auction clearing prices, what Non-Performance Charge Rate will apply to the resource when a Performance Assessment Hour occurs in all of those LDAs? Please use an example and explain how the proposed tariff revisions make clear how the Non-Performance Charge Rate will be calculated.

PJM Response:

The total commitment quantity of a commercially-aggregated resource must be allocated to the individual underlying resources for each month of the Delivery Year prior to the start of the Delivery Year. This allocation may be updated no later than the last day of each month for months remaining in the Delivery Year. These requirements are specified in PJM Manual 18: PJM Capacity Market, section 4.9.[20]

As an example, assume that a commercially-aggregated resource with a total capacity value of 50 MW is comprised of three capacity resources with the first resource ("Resource 1") located in the Penelec Zone (MAAC LDA), the second resource ("Resource 2") located in the PECO Zone (EMAAC LDA) and the third resource ("Resource 3") located in the PSEG Zone (PSEG LDA). The 50 MW commercially-aggregated resource will be modeled for RPM Auction purposes in the MAAC LDA, the smallest LDA in which all three individual underlying resources are physically located. Next assume that the commercially-aggregated resource clears

[18] Proposed PJM OATT at Attachment DD, section 10A(e) (emphasis added).

[19] PJM Transmittal Letter at 12-13 (emphasis added).

[20] Manual 18, section 4.9 currently specifies the allocation can be updated on a daily basis prior to 12 noon of the day preceding the delivery day. However, as part of PJM's proposed changes related to this filing, Manual 18 revisions are in process to reflect a monthly allocation with updates permitted each month for months remaining in the Delivery Year. This change is reflected in a document describing PJM's filed proposal presented at the 9/8/2016 Seasonal Capacity Resource Task Force. http://www.pjm.com/~/media/committees-groups/task-forces/scrstf/20160908/20160908-item-01-aggregation-of-seasonal-resources-business-rules.ashx

50 MW in the RPM Auction[21] and the 50 MW commercially-aggregated resource commitment is allocated to the underlying resources as follows: 30 MW to Resource 1, 10 MW to Resource 2, and 10 MW to Resource 3. Once each underlying resource is allocated a share of the total commercially-aggregated resource CP commitment quantity, each individual resource is treated identically to any other CP Resource when it comes to assessing performance for a PAH. That is, each resource that is physically located in an area defined by an Emergency Action is assessed performance based on the difference between its Actual Performance and Expected Performance (where Expected Performance is a function of the resource's committed MW quantity defined in Tariff, Attachment DD, section 10A), and the Non-Performance Charge Rate applicable to a non-performing CP Resource is based on the Net CONE of the LDA in which it is physically located. After the performance is determined for all CP Resources for a given PAH, the performance of resources that are part of a commercially-aggregated resource are netted to determine the over-performance of the commercially-aggregated resource. Continuing with the example, assume that a PAH encompasses an area in which all three underlying resources are physically located and Resource 1 over-performs by 6 MWs, Resource 2 under-performs by 3 MWs and Resource 3 under-performs by 7 MWs. The performance of the commercially-aggregated resource is equal to the sum of the performance of each underlying resource for a net non-performance of 4 MW. The non-performance charge rate applied to the 4 MW under-performance of the commercially-aggregated resource is based on a weighted average of the Net CONE values of the LDAs in which the underlying under-performing resources are physically located. Because there is a total of 10 MW of non-performance, 3 MW by Resource 2 and 7 MW by Resource 3, the weighted average is calculated based upon each Resource's share of the 10 MW total non-performance. Therefore, the weighted average is calculated as 3/10 of Net CONE of EMAAC LDA and 7/10 of Net CONE of PSEG LDA.

ii. For a Summer-Period Capacity Performance Resource or a Winter-Period Capacity Performance Resource that clears to meet the reliability requirement of an LDA other than the lowest level LDA in which it is located, which Non-Performance Charge Rate will apply—the rate based on the LDA in which the resource cleared or the rate based on the lowest level LDA in which the resource is located? Please explain how the proposed tariff revisions make clear which rate will apply when the two LDAs have different Non-Performance Charge Rates.

PJM Response:

The non-performance charge rate of a Seasonal CP Resource is based on the rate applicable to the LDA in which the Seasonal CP Resource is physically located. As per proposed changes in Section 10A(e):

[21] The commercially-aggregated reource will receive the Capacity Resource Clearing Price applicable to the MAAC LDA regardless of whether or not the EMAAC LDA or PSEG LDA clear at a different Capacity Resource Clearing Price.

For Capacity Performance Resources and Seasonal Capacity Performance Resources, the Non-Performance Charge Rate = (Net Cost of New Entry (stated in terms of installed capacity) for the LDA and Delivery Year for which such calculation is performed * (365 / 30)

(4) PJM proposes revisions to its Reliability Assurance Agreement to allow Seasonal Capacity Performance Resources to be included in Fixed Resource Requirement (FRR) Capacity Plans. Does PJM intend that an FRR entity including Seasonal Capacity Performance Resources in an FRR Capacity Plan must include an equal quantity, in megawatts, of Summer-Period Capacity Performance Resources and Winter-Period Capacity Performance Resources?

PJM Response:

There is no explicit requirement that the Summer-Period CP Resources and Winter-Period CP Resources in an FRR Entity's Capacity Plan be equal. However, given the Unforced Capacity obligation of an FRR Entity is constant across the entire Delivery Year, the Capacity Resources committed in an FRR Capacity Plan must satisfy the FRR Entity's Unforced Capacity Obligation for each day of the relevant Delivery Year. Summer-Period CP Resources will be considered to contribute to the obligation for each day of the summer period and Winter-Period CP Resources will be considered to contribute to the obligation for each day of the applicable winter period.

(5) Proposed section 5.5A(c)(i) of Attachment DD of the OATT states that Summer Period Demand Resources, as newly defined in the Reliability Assurance Agreement, are eligible to participate as Summer-Period Capacity Performance Resources. However, no equivalent winter-period demand resource is defined or listed as an eligible resource type under the definition of Winter-Period Capacity Performance Resource in section 5.5A(c)(ii). Why does PJM propose to exclude a winter-period demand resource from participating as a Seasonal Capacity Performance Resource?

PJM Response:

PJM has never had exclusively winter-period demand resources, and no market participant proposed such a product in the stakeholder process. Such resources thus were not consciously excluded; they simply were not contemplated.

Moreover, while PJM worked with stakeholders at the Seasonal Capacity Senior Task Force to enhance the existing CP rules by enhancing the "Commercial Aggregation" rules and establishing "RPM Aggregation," these types of aggregation did not supplant the DR "registration aggregation" rules that provide significant flexibility to accommodate the aggregation of individual sites to meet the annual capacity requirement. In other words, Curtailment Service Providers ("CSPs") had, and still have, the ability to aggregate individual customer sites within a registration to determine the nominated amount of capacity. The ability to aggregate customer sites within a registration allows DR to create an annual resource from a collection of customer sites including sites with winter demand reduction exceeding summer demand reduction. The nominated capacity on the registration is based on the sum of the individual site Peak Load Contributions ("PLC") which represents the amount of capacity allocated to the sites. The PLC is determined by the electric distribution company and in most cases is based on the customer's summer demand during peak days.

While PJM is not opposed to concept of a winter-period demand resource Winter Only DR resource, doing so would require significant related changes to market rules. For example, the current DR nomination process is based on the summer usage Peak Load Contribution construct and would need to be changed.

(6) Is the marginal reliability benefit of capacity different when adding capacity in the summer versus the winter? That is, if a specified number of additional MWs in a specified location were to take on a capacity obligation in the PJM system for only one season (while holding constant the number of MWs in the other season), would the reduction in system-wide Loss of Load Expectation (LOLE) resulting from the additional MWs differ depending on the season in which the additional MWs are added? If so, in which season would adding the specified number of MWs reduce the system-wide LOLE more? Has PJM conducted any studies or analyses that quantify this difference in the marginal reliability value of capacity by season? If so, what is the quantitative difference in the marginal reliability value of capacity by season that the studies or analyses found?

PJM Response:

PJM has had an annual capacity requirement based on an annual Loss of Load Expectation ("LOLE") criterion for as long as PJM has had a capacity obligation, since 1974. To PJM's knowledge, every other RTO or ISO with a forward capacity obligation has an annual capacity requirement, as did reserve-sharing and power pool arrangements in place under Commission-jurisdictional agreements at various times. Most if not all such regional capacity arrangements have been summer-peaking, even while particular individual utilities may be winter-peaking. It is inherently the case that, for a winter-peaking system, the *marginal* reliability benefit of a unit of capacity added in the winter will be greater than the *marginal* reliability benefit of a unit of capacity added in the summer. Conversely, it is inherently the case that, for a summer-peaking system, the *marginal* reliability benefit of a unit of capacity added in the summer will be greater than the *marginal* reliability benefit of a unit of capacity added in the winter. Crucially, however, a focus on marginal reliability benefit ignores the reliability benefit of the vast majority of resources (i.e., those that are infra-marginal) that are needed to meet capacity requirements that exist all year.

In addition to an annual capacity market's direct alignment with PJM's annual capacity requirements, PJM believes that the annual capacity commitment and clearing price provide a superior investment signal to a sub-annual market. A primary driver of the capacity market is to provide a mechanism by which resource owners can predictably recover what would otherwise be unrecoverable costs in order to make rational entry and exit decisions into the market.[22] Such investment decisions are made based on long-term projections of market clearing prices and required revenues of which the PJM capacity market is a significant part of. For this reason,

[22] *PJM Interconnection, L.L.C.*, 117 FERC ¶ 61,331, at P 68 (2006) (RPM "addresses the Commission's concerns that appropriate price signals are available to provide incentives to construct facilities necessary for regional reliability by assuring that the market value of resources used to meet the capacity requirements reflect actual deliverability and availability of the capacity resource within the specific region relying on that resource."). Indeed, the Commission has found that the applicable price signal may be distorted when "the algorithm clears lower-cost limited availability demand response products at the expense of any additional Annual Resources," *PJM Interconnection, L.L.C.*, 146 FERC ¶ 61,052, at P 61 (2014), and approved, as just and reasonable, tariff changes to the clearing algorithm that "help ensure that the capacity market encourages the development of the Annual Resources PJM relies on in the delivery year." *Id.* at P 64.

stability and predictability are key goals that determine the success of the capacity market and ultimately PJM's ability to maintain resource adequacy because rational investment depends on them. PJM views the design of the capacity market as being annual as a way to achieve stability and predictability to promote rational decision-making. In order to further enhance the value of the capacity market, PJM has on a number of occasions discussed the desire to provide for longer term commitments in the capacity market. These longer-term commitments will help provide consistent revenue streams for generation resources and also consistent costs for consumers.

Further, a switch to discrete seasonal capacity markets could distort the long-term price signal purpose of RPM. In this way, PJM views a sub-annual capacity market to be a significant step backwards. The fragmenting of the capacity market into sub-annual commitments and clearing prices can only inject volatility into the market and strand conventional generation assets that were built to serve the reliability needs of the RTO.

PJM annually performs an IRM study to determine the level of installed reserves required to satisfy a LOLE standard of one loss of load event in ten years (commonly referred to as the "1 in 10" LOLE standard). The IRM Study determines the minimum Installed Reserve Margin required to satisfy the "1 in 10" LOLE standard. The IRM for Delivery Year 2020/2021, for example, is 16.6% and it is expressed as a percentage of the forecasted PJM summer peak load. This margin is 34% when expressed as a percentage of the forecasted PJM winter peak load.

Since the objective of the IRM Study is to minimize the IRM and PJM is a summer-peaking system, virtually all of the annual LOLE risk in the IRM Study occurs in the summer period. In essence, this result is equivalent to having a summer LOLE risk equal to 0.1 days/year (or "1 in 10") and a winter LOLE risk that must be virtually zero so that the total annual risk is equal to 0.1 days/year. Therefore, the installed reserves in the winter must not fall below 34% (to use the IRM for Delivery Year 2020/2021 cited above as an example). If winter reserves were to drop below 34%, the winter LOLE risk would increase and therefore the PJM LOLE would exceed 0.1 days/year.(because the IRM is expressed to one decimal point, I'm not sure the IRM would actually rise above 16.6%)

To focus solely on the marginal seasonal reliability benefit posed in this request (and ignore the reliability benefit of resources needed year-round), one could posit the addition of a generating unit, with a PJM average capability of 110 MW and PJM average forced outage rate of 7.35%, to the summer season only. For the 2020/2021 Delivery Year, this hypothetical addition would reduce the LOLE to 0.09809 days/year. This represents an LOLE reduction of 0.00191 days/year compared to the base case, which would be equivalent to avoiding incrementally a loss of load event that otherwise would occur only once every 523 years.

Correspondingly, one could posit the addition of a generating unit (again with a rating of 110 MW and a forced outage rate of 7.35%) to the winter season only. As noted above, however, PJM's long-standing approach to minimizing the annual capacity requirement assigns virtually zero loss of load risk to the winter. A loss of load risk that already is virtually zero cannot be further reduced by the addition of another generating unit.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Additionally, 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,[23] 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[24] alerting them that this filing has been made by PJM and is available by following such link. PJM also serves the parties listed on the Commission's official service list for this docket. 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 FERC'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.

Dated at Audubon, PA this 23rd day of January, 2017.

/s/ Jennifer Tribulski
Jennifer Tribulski

Assistant General Counsel,
PJM Interconnection, L.L.C.

[23] *See* 18 C.F.R. §§ 35.2(e), 385.2010(f)(3).

[24] PJM already maintains, updates, and regularly uses email lists for all PJM members and affected state commissions.