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June 3, 2022

The 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. ER22-___-000*
Revisions to PJM's FTR Credit Requirement

Dear Secretary Bose:

PJM Interconnection, L.L.C. ("PJM"), pursuant to section 205 of the Federal Power Act ("FPA"),[1] and part 35 of the Federal Energy Regulatory Commission's ("FERC" or the "Commission") regulations,[2] hereby submits proposed changes to the PJM Open Access Transmission Tariff ("Tariff")[3] to revise the calculation of the Financial Transmission Right ("FTR") Credit Requirement, which sets the collateral that FTR Participants are required to provide in order to participate in PJM's FTR market ("Revised FTR Credit Requirement").

As shown in this filing, the Revised FTR Credit Requirement more accurately reflects in collateral requirements the risk that a FTR portfolio could suffer market losses, and thus will better protect PJM Members from potential losses resulting from default.

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[1] 16 U.S.C. § 824d.

[2] 18 C.F.R. part 35.

[3] The Tariff is currently located under PJM's "Intra-PJM Tariffs" eTariff title. *See PJM Interconnection, L.L.C. - Intra-PJM Tariffs*, https://etariff.ferc.gov/TariffBrowser.aspx?tid=1731 (last visited May 25, 2022). Terms not otherwise defined herein shall have the same meaning as set forth in the Tariff, and the Amended and Restated Operating Agreement of PJM Interconnection, L.L.C. ("Operating Agreement").

PJM's proposed methodology employs a widely-accepted value-at-risk ("VaR") approach using observed price movements in a historical simulation ("HSIM") model to estimate PJM's exposure, on a per-portfolio basis, from a particular FTR Participant and its FTR market activity.[4]

The Tariff changes in this filing are the same as those PJM presented in its December 2021 FPA section 205 filing in Docket No. ER22-703-000,[5] which the Commission found unsupported.[6] The Commission's order rejecting the prior filing found that PJM's existing FTR Credit Requirement may be unjust and unreasonable and opened a show-cause proceeding under FPA section 206,[7] but also allowed that, if PJM preferred, it could submit a new section 205 filing proposing changes to the FTR Credit Requirement.[8] By this filing, PJM takes that preferred path. In so doing, PJM submits additional analysis including a cost/benefit analysis which was not available at the time of its original filing, which supports this filing as just and reasonable and addresses each of the Commission's concerns raised in the February 28 Order. This additional information provides ample record support that this proposal is a just and reasonable alternative to the status quo.

[4] Value at risk ("VaR") is a statistic that quantifies the extent of possible financial losses within a firm, portfolio, or position over a specific time frame.

[5] *PJM Interconnection, L.L.C.*, Revisions to PJM's FTR Credit Requirement and Request for 28-Day Comment Period, Docket No. ER22-703-000 (Dec. 21, 2021) ("December 2021 Filing"); *amended by PJM Interconnection, L.L.C.*, Amendment to Revisions to PJM's FTR Credit Requirement, Docket No. ER22-703-001 (Dec. 30, 2021).

[6] *PJM Interconnection, L.L.C.*, 178 FERC ¶ 61,146 ("February 28 Order"); *reh'g denied*, 179 FERC ¶ 62, 028 (2022).

[7] February 28 Order at P 37. The FPA section 206 proceeding was assigned Docket No. EL22-32-000.

[8] *Id.* at P 38.

As demonstrated below, the Revised FTR Credit Requirement will enable PJM to maintain collateral that is reasonably calibrated to protect PJM and Members against the risks of FTR portfolio losses. As PJM also shows, the Revised FTR Credit Requirement meets this important objective, articulated by the February 28 Order, while employing the HSIM model with a 97% confidence interval. PJM's additional cost/benefit and related analyses as provided in this filing make clear that the objective of protecting PJM and its Members against the risk of FTR portfolio losses can be substantially achieved at a 97% confidence interval at significantly less cost to PJM members. It is for this reason that this proposal is strongly supported by an overwhelming majority of PJM Members—including those who must bear the costs of any payment defaults resulting from FTR portfolio losses.[9]

As noted above, the February 28 Order initiated an FPA section 206 proceeding in Docket No. EL22-32-000 to investigate whether the current FTR Credit Requirement is unjust and unreasonable. On May 31, 2022, PJM moved to hold that proceeding in abeyance, given the imminent submission of this filing. As PJM explained, the requested abeyance will permit the Commission to evaluate the extent to which the new section 205 filing resolves the concerns that prompted the February 28 Order to find that the FTR Credit Requirement may be unjust and unreasonable.[10] The requested abeyance will also afford PJM time to investigate further a concern noted in the February 28 Order about ensuring

[9] At a special meeting on March 23, 2022 devoted to this issue, the PJM Members Committee, in an advisory vote, voted 3.266 on a sector basis (equivalent to65.3 %) that the first preference was that PJM refile, with additional support, the Revised FTR Credit Requirement with a 97% confidence interval. By contrast, only 10.1 % (sector vote of 0.507) voted for filing with a 99% confidence interval as their first preference, and only 28.8% (sector vote of 1.439) voted for filing with a 97% confidence interval and then moving to a 99% confidence interval in a year as their first preference.

[10] *See id.* at PP 35-37.

adequate collateral protection for "the riskiest market participants,"[11] which is an issue addressed by other PJM Tariff provisions, and that was not the focus of the FTR Credit Requirement. PJM has initiated a stakeholder process to address how best to apply PJM's existing Tariff tools to protect against participant-related risks, or whether further Tariff changes may be needed to support that objective. As PJM explained, it expects to complete its assessment by December 2022, and in the meantime, if abeyance is granted, will provide updates on the status of PJM's stakeholder process every 60 days.

In support of this filing, PJM includes affidavits of its Vice President, Chief Financial Officer and Treasurer, and Acting Chief Risk Officer, Ms. Lisa M. Drauschak;[12] and Dr. Alexander Eydeland, PhD., a mathematics professor and expert in energy risk management.[13]

PJM proposes an effective date of August 3, 2022, sixty days from the date of this filing, for these Tariff changes.

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[11] *Id.* at P 33.

[12] Affidavit of Lisa M. Drauschak on Behalf of PJM Interconnection, L.L.C. (Attachment C) ("Drauskchak Aff.").

[13] Affidavit of Dr. Alex Eydeland on Behalf of PJM Interconnection, L.L.C. (Attachment D) ("Eydeland Aff.").

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I. BACKGROUND

A. PJM's Current Approach to Determining the FTR Credit Requirement and Limitations to the Current Approach

PJM's Tariff[14] establishes a credit requirement for FTR Participants for their FTR bids into, or purchases through, FTR auctions.[15] Each FTR Participant's FTR Credit Requirement is currently determined on a portfolio basis and is based on five (5) factors, each of which was previously approved by the Commission: (1) a financial exposure calculation for each FTR path based on FTR Historical Value;[16] (2) the addition of an increment for portfolios considered undiversified;[17] (3) the application of a $0.10 per megawatt hour ("MWh") volumetric minimum charge;[18] (4) the subtraction of Auction Revenue Rights ("ARR") Credits in an FTR Participant's account;[19] and (5) subtraction of negative Mark-to-Auction ("MTA") values.[20] The current Tariff also provides that long-term FTR Credit Requirement calculations will be updated annually, consistent with the

[14] Tariff, Attachment Q, section VI.C.2; *see* PJMSettlement, Inc., *Credit Overview and Supplement to the PJM Credit Risk Management Policy*, PJM Interconnection, L.L.C., 30-31 (June 23, 2021), https://www.pjm.com/-/media/documents/agreements/pjm-credit-overview.ashx.

[15] Market participants can bid for FTRs in (i) PJM's long-term FTR Auction, providing FTRs for periods of one to three years; (ii) PJM's FTR Annual Auction, making available FTRs for transmission capability of the entire PJM Region; and (iii) FTR Monthly Auctions, making available FTRs for any remaining transmission capability. *See* Operating Agreement, Schedule 1, sections 7.1.1(a) and 7.1A.1(i); *Financial Transmission Rights FAQs*, PJM Interconnection, L.L.C., https://learn.pjm.com/three-priorities/buying-and-selling-energy/ftr-faqs.aspx#faq-box-text1 (last visited May 25, 2022).

[16] *See* Tariff, Attachment Q, section VI.C.2; *PJM Interconnection, L.L.C.*, Letter Order Docket No. ER06-594-000, at 1 (Mar. 22, 2006) ("ER06-594 Order"). The Tariff defines FTR Historical Value as "the weighted average of historical values over three years for the FTR path using the following weightings: 50% - most recent year; 30% - second year; 20% - third year." Tariff, Part I, Definitions – E - F.

[17] *See* Tariff, Attachment Q, section VI.C.6; *PJM Interconnection, L.L.C.*, 122 FERC ¶ 61,279, at 79 (2008).

[18] *See* Tariff, Attachment Q, section VI.C.2; *PJM Interconnection, L.L.C.*, 164 FERC ¶ 61,215, at 13 (2018).

[19] *See* Tariff, Attachment Q, section VI.C.2; ER06-594 Order at 1.

[20] *See* Tariff, Attachment Q, section VI.C.9; *PJM Interconnection, L.L.C.*, 167 FERC ¶ 61,002, at 19 (2019).

updating of historic values used for the FTR Credit Requirement calculations in the annual auctions.[21]

There are several limitations in the current approach to determining the FTR Credit Requirement.

First, the principal component of the current calculation, i.e., the potential financial exposure from each FTR path, is based on FTR Historical Value, which, as noted above,[22] is the weighted average of historical values for the FTR path for the three most recent years, with the single most recent year afforded 50% of the weight.

Second, the simplified weighting assumption in the current approach, according 50% weight to the most recent year, effectively assumes that market scenarios in future years are substantially predicted by the single most recent year. This simplifying assumption unduly constrains the wide range of conditions and scenarios that could occur in any year, and thus could lead to errors in both risk evaluation and margin collection.

Third, the current method updates only by adding new data without retaining older data, and thus does not consider cumulative data points reflecting the historical development of the market.

Fourth, the current approach attempts to capture additional potential financial exposure, but those efforts are limited by their simplifying assumptions. In particular, the current FTR Credit Requirement calculation includes an adder[23] for portfolios that are deemed to present heightened risk from being undiversified.

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[21] *See* Tariff, Attachment Q, section VI.C.8.

[22] *See supra* note 16.

[23] *See* Tariff, Attachment Q, section VI.C.6.

B. The December 2021 Filing, and the February 28 Order

The December 2021 Filing followed a lengthy stakeholder process, as part of PJM's continuing efforts, working with its stakeholders, to enhance its FTR credit and collateral rules to better reflect the market risks of FTR transactions. As PJM explained in the December 2021 Filing, much of that recent effort has been guided by, and responsive to, the findings and recommendations of an investigation by expert independent consultants, commissioned by the PJM Board of Directors, into the circumstances leading to GreenHat Energy, LLC's ("GreenHat") June 1, 2018 default on its FTR portfolio.[24] The GreenHat Report included recommendations regarding the collateral required to address the forward value risk of the transaction at the time of execution.[25] The December 2021 Filing details the two-year stakeholder process, focused on PJM's Financial Risk Management Senior Task Force ("FRMSTF"), that laid the groundwork for, and shaped, the Tariff changes embodied in the Revised FTR Credit Requirement.[26] Based on that work, and with the strong endorsement of stakeholders, PJM submitted the December 2021 Filing on December 21, 2021.

The February 28 Order rejected the December 2021 Filing, holding that the record was insufficient to demonstrate that the proposal was just and reasonable.[27] The Commission found that PJM failed to demonstrate that its revisions were reasonably

[24] *See* Robert Anderson et al.,, *Report of the Independent Consultants on the Green Hat Default*, PJM Interconnection, L.L.C. (Mar. 26, 2019), https://www.pjm.com/-/media/library/reports-notices/special-reports/2019/report-of-the-independent-consultants-on-the-greenhat-default.ashx?la=en ("GreenHat Report").

[25] GreenHat Report at Appendix Page 1 (Recommendation A).

[26] *See* December 2021 Filing at 7-10.

[27] February 28 Order at P 31.

calibrated to ensure that FTR Market Participants will be required to provide adequate collateral relative to the risks of their positions.[28] Noting record evidence that the proposed revisions would result in lower aggregate collateral than PJM's pre-existing collateral levels, the Commission found in particular that "lack of support regarding how the HSIM model used at a 97% confidence interval establishes reasonably calibrated collateral levels for riskier portfolios means that PJM has not met its burden to show that the FTR Credit Revisions are just and reasonable."[29]

C. Subsequent Stakeholder Engagement

Following the February 28 Order, PJM solicited stakeholder feedback on the best approach to address the concerns raised by that order. PJM held two committee meetings in the first half of March 2022[30] and sought feedback from Members through an electronic feedback form available until March 15, 2022. During the March 23, 2022 Members Committee meeting, Members in an advisory vote preferred by a supermajority refiling the Revised FTR Credit Requirement with a 97% confidence interval as proposed in the December 2021 Filing accompanied by additional support.[31] PJM subsequently held several stakeholder meetings in April and May 2022 to update and advise the membership of its proposal and the additional support to be provided in its filing. At a special meeting of the

[28] *Id.* at P 33.

[29] *Id.* The Commission also raised concern about the implications for the filing from "recent defaults involving the FTR market." *Id*.

[30] Members Committee, *Agenda*, PJM Interconnection, L.L.C., (Mar. 21, 2022), https://www.pjm.com/-/media/committees-groups/committees/mc/2022/20220321/20220321-agenda.ashx; Members Committee, *Agenda*, PJM Interconnection, L.L.C., (Mar. 23, 2022), https://www.pjm.com/-/media/committees-groups/committees/mc/2022/20220323/20220323-agenda.ashx.

[31] *See* Members Committee, *FTR Credit Requirement Filing*, PJM Interconnection, L.L.C., 5 (Apr. 14, 2022), https://pjm.com/-/media/committees-groups/committees/mc/2022/20220414-special/20220414-item-01-ftr-credit-requirements.ashx.

Members Committee on April 14, 2022, PJM presented the study, as described in this filing, of the incremental costs and benefits of using a 99% confidence interval in place of a 97% confidence interval. PJM also provided updated estimates of the collateral that would be required by the Revised FTR Requirement with a 97% confidence interval, and with a 99% confidence interval. Both scenarios would reduce overall collateral, relative to the status quo, and PJM committed to return to stakeholders with an assessment of the causes for that collateral reduction.

On May 24, 2022, PJM presented to the Risk Management Committee the results of its analysis of the drivers of the collateral reduction in the Revised FTR Credit Requirement compared to the current FTR Credit Requirement, to confirm these Tariff changes are in fact risk-reducing. PJM also discussed its plans for assessing how to use additional tools and analyses to address the riskiest participants.[32]

II. THE REVISED FTR CREDIT REQUIREMENT IS JUST AND REASONABLE

A. Overview

PJM has structured this transmittal letter to better respond to the particular procedural posture of this case, i.e., as a new section 205 filing to replace a prior section 205 filing that the Commission found inadequately supported. Accordingly, after describing the Revised FTR Credit Requirement, PJM presents the support needed to respond to, and fully address, each of the concerns raised in the February 28 Order. PJM then presents its remaining evidence that the Revised FTR Credit Requirement is just and reasonable.

[32] *See* Risk Management Committee, *FTR Credit Requirement Filing*, PJM Interconnection, L.L.C., 32 (May 24, 2022), https://pjm.com/-/media/committees-groups/committees/rmc/2022/20220524/item-04---ftr-credit-requirements.ashx.

B. The Revised FTR Credit Requirement

The Revised FTR Credit Requirement includes multiple changes to the current FTR Credit Requirement calculation set forth in Tariff, Attachment Q, section VI.C. First, PJM proposes to replace, for FTR Obligations,[33] the current approach of calculating the potential payment exposure of each FTR path based on FTR Historical Value, with a margin[34] calculation from an HSIM model using a 97% confidence interval.[35]

Second, PJM proposes to remove from Attachment Q, section VI.C.2 the undiversified adder component of the FTR Credit Requirement calculation, given PJM's analysis and expert advice that the adder is not correlated with market risk, and thus could result in a margin that does not sufficiently protect against the risks of default.[36]

Third, PJM proposes to delete the component currently in Attachment Q, section VI.C.8 relating to long-term FTR Credit recalculation. This provision for capturing additional FTR values is no longer needed under the Revised FTR Credit Requirement,

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[33] "The hourly economic value of a Financial Transmission Right Obligation is based on the Financial Transmission Right MW reservation and the difference between the Day-ahead Congestion Price at the point of delivery and the point of receipt of the Financial Transmission Right. The hourly economic value of a Financial Transmission Right Obligation is positive (a benefit to the FTR Holder) when the Day-ahead Congestion Price at the point of delivery is higher than the Day-ahead Congestion Price at the point of receipt. The hourly economic value of a Financial Transmission Right Obligation is negative (a liability to the FTR Holder) when the Day-ahead Congestion Price at the point of receipt is higher than the Day-ahead Congestion Price at the point of delivery." Operating Agreement, Schedule 1, section 5.2.2(b).

[34] PJM's frequent references to the margin required by the HSIM model as the "initial margin" *should not* be read to imply that the HSIM's margin is set when a participant acquires a position in an FTR Auction and cannot be thereafter changed. To the contrary, an advantage of the HSIM model is that it is continuously updated with new pricing information for FTR paths after every auction, thereby adding to the historic information used in the simulation. Every FTR Participant's margin component required by the HSIM model is therefore updated, for each Participant's entire portfolio, even if the Participant did not take any positions in the latest auction.

[35] *See* proposed Tariff, Attachment Q, section VI.C.2. PJM does not propose this change for FTR Options because trading activity in FTR Options is a fraction of the trading activity in FTR Obligations, and because PJM does not have the same extent of historical data for FTR Options as it has for FTR Obligations.

[36] *See* Drauschak Aff. at 8.

because the proposed HSIM model will be routinely updated with the latest FTR auction results and prices.

Fourth, PJM proposes to retain the $0.10/MWh volumetric minimum charge, but apply it after any ARR Credits or MTA adjustments are applied.[37] At present, the minimum charge is applied before ARR credits or MTA adjustments—which means that the current FTR Credit Requirement can result in a zero value. This result, however, frustrates the intended purpose of the volumetric minimum charge. The volumetric minimum was intended to address the risk posed by an FTR Holder acquiring a large volume FTR portfolio without having to provide financial security that considers the size of the FTR portfolio, given that a large portfolio in itself presents a financial risk.[38] The proposal filed at the time, however, overlooked the impact of the ARR credit, which can reduce the FTR Credit Requirement to zero.[39] In addition, as noted below, PJM also proposes in this filing to provide that the FTR Credit Requirement can be decreased when the MTA value is positive. Given the potential for significant MTA fluctuations, this adjustment also could operate to reduce or negate the $0.10/MWh minimum.

Applying this minimum *after* application of the ARR credit and MTA components will preserve and advance the original objective of the minimum requirement by preventing FTR Holders whose FTR portfolios have a significant MWh volume of positions from having little to no credit requirements. This ensures that the $0.10/MWh minimum floor

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[37] Proposed Tariff, Attachment Q, section VI.C.2.

[38] *PJM Interconnection, L.L.C.*, FTR Credit Requirement, Docket No. ER18-2090-000 (July 27, 2018).

[39] PJM's 2018 filing did not discuss the possible impact of the ARR credit, no commenter raised the issue, and the Commission did not address ARR credits in its order accepting the proposed volumetric minimum. *See PJM Interconnection, L.L.C.*, 164 FERC ¶ 61,215, at PP 12-14 (2018).

operates as it was intended: as a backstop to avoid a de minimus or net zero FTR Credit Requirement.

Fifth, PJM proposes to make explicit an adjustment for realized gains and losses, so as to ensure that particular adjustment is not inadvertently eliminated as a result of adopting the initial margin approach. As used here, realized gains and losses refer to profits or losses from sales of FTRs and gains or losses realized from holding an FTR to settlement. It reflects any positions that have "flowed" and not yet been billed, as well as positions that have "flowed" and *were* billed, but have not yet been paid. Today, this calculation and reflection of realized gains and losses is handled through PJM's "Total Current Exposure" calculation. PJM's proposed HSIM model will take account of those realized gains and include them as a component of the total FTR Credit Requirement, while also removing this component from the Total Current Exposure calculation to ensure proper application**.** That treatment reflects that these gains and losses are directly involved in FTR market participation, so they are best accounted for as part of the FTR Credit Requirement. Accordingly, PJM is preserving this adjustment with separate, explicit Tariff language which will improve transparency in the application of this adjustment.[40] Similar to the current inherent approach, the new language provides that, at the time of settlement, gains will be considered a payment and losses will be a charge to the participant, such that gains result in a decrease to, and losses result in an increase to, the FTR Credit Requirement.[41]

[40] Proposed Tariff, Attachment Q, section VI.C.2.e.

[41] *Id.*

Sixth, PJM proposes to provide that the FTR Credit Requirement can be increased or decreased, depending on the net MTA impact, to acknowledge that an FTR Participant with FTRs that have become more or less valuable than they were at the time they were transacted results in an incremental increase or reduction in the FTR Participant's market risk exposure.[42]

In addition, while PJM is not proposing any substantive change to the ARR credit provisions, those provisions, which are currently found in various sections of the FTR Credit Requirement, will now be housed in a single section.[43] PJM also proposes to make a ministerial adjustment to the MTA section[44] to align with the default provisions of the Operating Agreement regarding the deadline for fulfilling a demand for additional Collateral.[45]

C. Response to Concerns Raised by February 28 Order

1. Using a 97% confidence interval in the HSIM model is just and reasonable; by contrast, the added costs of using a 99% confidence interval appear to exceed its added benefits.

The February 28 Order noted commenters' "congruence of opinion in support" of use of an HSIM model, removal of the undiversified adder, and re-ordering application of the $0.10.Mwh minimum charge.[46] "The principal disagreement among the parties," the

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[42] Proposed Tariff, Attachment Q, section VI.C.2(7).

[43] *Compare* Tariff, Attachment Q, sections VI.C.2, VI.C.6, *with* proposed Tariff, Attachment Q, section VI.C.2.b; *see PJM Interconnection, L.L.C.*, 122 FERC ¶ 61,279, at P 4 (2008) (accepting ARR credit requirement). The Commission accepted the current ARR credit provisions to "allow[] for a correct offset between ARR credits and FTR credits." *PJM Interconnection, L.L.C.*, Revisions to PJM Credit Policy Attachment Q, Docket No. ER08-376-000, at 6 (Dec. 26, 2007).

[44] Proposed Tariff, Attachment Q, section VI.C.7.

[45] *See* Operating Agreement, section 15.1.5.

[46] February 28 Order at P 40.

Commission observed, is "the appropriate confidence interval for the HSIM model."[47] That issue also appears to be the principal basis for the Commission's rejection of the December 2021 Filing. The February 28 Order "agree[d] with [the Organization of PJM States] and the [Independent] Market Monitor [for the PJM Region]," both of which focused their arguments on the December 2021 Filing's choice not to use a 99% confidence interval, "that the record fails to support PJM's proposed use of an HSIM model with a 97% confidence interval."[48]

PJM has devoted considerable attention to this issue in the wake of the February 28 Order, engaging repeatedly with stakeholders and conducting additional analyses. Based on that work, it is clear that a 97% confidence interval can be a just and reasonable component of the HSIM model and the Revised FTR Credit Requirement. As detailed below, PJM has found that: i) the 97% confidence interval provides most of the protection that a 99% confidence interval would provide; ii) a 99% confidence interval greatly increases collateral requirements relative to a 97% confidence interval; iii) the 99% confidence interval's increased collateral requirement falls disproportionately on FTR Participants that serve load; and iv) the incremental costs of using a 99% confidence interval (relative to using 97%) appear to exceed the incremental benefit of using a 99% confidence interval. PJM also shows, in section II.C.2 of this transmittal, that the 97% confidence interval results in a collateral requirement that is reasonably calibrated to protect PJM and its Members from FTR Participant payment defaults due to FTR portfolio risks, and that the 97% confidence

[47] *Id.*

[48] February 28 Order at P 32 & n.57.

interval is not the driver of the reduction in collateral (relative to the status quo) expected from adoption of the Revised FTR Credit Requirement.

PJM emphasizes at the outset that the Commission has never held that a 99% confidence interval is mandatory for credit modeling. In any statistical model, the confidence interval simply reflects a choice, or judgment, about the level of certainty desired from the output of the model.[49] Which interval to choose for any particular analysis goes beyond statistics, and implicates considerations of the relative value, and the relative cost, of obtaining that extra increment of certainty.[50] Thus, the balancing considerations inherent in the choice of a confidence interval land that choice—when it affects a Commission-jurisdictional rate—squarely in the ambit of the well-settled FPA principle that there can be more than one just and reasonable rate.[51]

By contrast, were the Commission to mandate a 99% confidence interval here, and base that decision *primarily* on the fact that a number of *non-jurisdictional* exchanges use a 99% confidence interval, the Commission would not be basing that decision on facts specific to PJM and its markets, and would effectively be mandating that 99% confidence interval

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[49] Eydeland Aff. at 8.

[50] *Id.* at 8-9.

[51] *See New England Power Generators Ass'n, Inc. v. ISO New England Inc.*, 150 FERC P 61,064, at P 19 n.36 (2016) (citing *PJM Interconnection, L.L.C.*, 119 FERC P 61,063, at P 39 (2007) ("The Commission has permitted different just and reasonable rate designs reflective of particular system characteristics and stakeholder input. In this regard, we have stated our deference to regional preferences a number of times . . . as well as in our approval of rate designs for different regional markets.") (citing *Southwest Power Pool, Inc.*, 106 FERC P 61,110, at PP 218-219 (2004); *Southwest Power Pool, Inc.*, 111 FERC P 61,118, at P 39 (2005); *Cal. Indep. Sys. Operator Corp.*, 109 FERC P 61,301 (2004), *reh'g denied*, 111 FERC P 61,337 (2005); *New England Power Pool and ISO New England, Inc.*, 109 FERC P 61,252 (2004), *clarified*, 110 FERC P 61,003 (2005); *Midwest Indep. Transmission Sys. Operator, Inc.*, 127 FERC P 61,109, at P 20 (2009) ("It is well established that there can be more than one just and reasonable rate."); *New York Indep. Sys. Operator, Inc.*, 126 FERC P 61,320, at P 40 (2009) ("there can be more than one just and reasonable planning process and [different regions] are not required to have identical planning processes")).

modeling assumption for any regional transmission organization or independent system operator that uses statistical models to set its credit requirements. PJM urges the Commission not to impose that mandate, and instead consider the evidence, described below, that a 97% confidence interval is just and reasonable for the particular circumstances of PJM and its FTR market.

a. <u>The incremental costs of using a 99% confidence interval appear to exceed its incremental benefits</u>

As part of PJM's effort to investigate and better address this concern, PJM conducted a cost/benefit analysis that compared the incremental cost to Members[52] and the incremental benefit to Members of employing a 99% confidence interval—rather than a 97% confidence interval—in the HSIM model.

The starting point, to put this comparison of the 97% and 99% confidence intervals in context, is the level of benefit provided by the 97% confidence interval. Using an HSIM with a 97% confidence interval does a far better job than the current rules of limiting both the frequency and overall dollar magnitude of instances (known as the "failure rate") when losses in an FTR Participant's FTR portfolio exceed the collateral collected by the FTR Credit Requirement. Specifically, discussed in more detail in section II.C.2 of this transmittal, the HSIM with a 97% confidence interval was found, through back-testing, to result in a failure rate of around 3%, compared to a failure rate of around 11% from the current rules.[53] As also detailed in section II.C.2 of this transmittal, the HSIM with a 97%

[52] PJM uses the term "Members" for this cost-benefit comparison, because all FTR Market Participants, who must obtain and provide collateral, are Members, and any payment default by a party that is subject to the Revised FTR Credit Requirement is recouped via default allocation assessments on Members.

[53] See section II.C.2 of this transmittal, below.

confidence interval reduced the overall dollar amount of such failures by over 80% in one back-test, and by over 94% in the second back-test.[54] The question for the cost-benefit analysis is how much more protection, at how much more cost, does use of a 99% confidence interval provide.

As explained by Ms. Drauschak, for PJM's cost/benefit analysis, Members' cost is the financial cost of providing the higher collateral that results from the higher confidence interval. Members' benefit is the incremental reduction in FTR Participant defaults—the costs of which are allocated to Members. Ms. Drauschak elaborates on each of these elements.[55] On the cost side, PJM estimated the collateral that would result from applying the Revised FTR Credit Requirement (including its 97% confidence interval) and the collateral that would result from the Revised FTR Credit Requirement, but with a 99% confidence interval.[56] For this purpose, PJM used the same collateral estimates that were presented in the stakeholder process that preceded the December 2021 Filing, and that were cited by the February 28 Order.[57] The aggregate increase in collateral from those estimates due to using a 99% confidence interval, for all FTR Market Participants, was $585.3 million, or a 48.0% increase in collateral relative to using a 97% confidence interval.[58] The cost of maintaining collateral of a given amount is the implicit cost of financing that amount—in this analysis, the cost of financing the increment of $585.3 million in collateral resulting from using a 99% confidence interval instead of a 97% confidence interval. As Ms.

[54] *Id.*

[55] Drauschak Aff. at 14-15.

[56] Drauschak Aff. at Exhibit B.

[57] February 28 Order at PP 8, 33.

[58] Drauschak Aff. at 19.

Drauschak explains, that cost exists even if a Member uses internal funds to supply the added collateral, since those funds are then unavailable for other purposes, and that deployment of funds for a significant period of time has a market value, based on current market rates for borrowing capital.[59] To reasonably bracket this cost of funds, PJM made both a low estimate and a high estimate. For the low estimate, PJM used published London Interbank Offer Rates ("LIBOR") as of March 25, 2022, plus a spread to reflect FTR Market Participants' different credit ratings, based on PNC Bank revolving credit facility rates.[60] For the high cost of funds estimate, PJM used a flat rate of 8%.[61]

The end result of the cost side of PJM's analysis, as shown in Figure 1 below, which is taken from Exhibit D to Ms. Drauschak's affidavit, was that it would cost FTR Market Participants an additional $22.4 million using the low estimate, or $46.8 million using the high estimate, if the Revised FTR Credit Requirement employed a 99% confidence interval instead of a 97% confidence interval.[62]

[59] Drauschak Aff. at 14.

[60] Drauschak Aff. at 15.

[61] Drauschak Aff. at 15.

[62] Drauschak Aff. at Exhibit D.

Figure 1

Estimated Cost vs. Benefit Analysis

Dollars in millions	Low Rate Estimated Cost of Capital Moving From 97% to 99% CI	High Rate Estimated Cost of Capital Moving From 97% to 99% CI	Default Rate♦ 5% Sum of Improved Member Default Coverage across all Market Participants	Default Rate♦ 10%	Default Rate♦ 81%
End-Use Customer	$ -	$ -	$ -	$ -	$0.1
Electric Distributor	$0.9	$2.1	$ -	$0.2	$1.2
Generation Owner	$2.8	$5.3	$0.3	$0.6	$5.0
Transmission Owner	$1.6	$4.0	$0.3	$0.5	$4.6
Other Supplier	$17.1	$35.4	$0.8	$1.4	$11.5
Load Serving Entity	$3.7	$8.0	$0.4	$0.8	$6.2
Financial Trader	$9.5	$18.9	$0.1	$0.1	$1.1
Other Supplier	$3.9	$8.5	$0.3	$0.5	$4.2
Total	**$22.4**	**$46.8**	**$1.4**	**$2.7**	**$22.4**

♦ Default rate allocations as of January 2022

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On the benefit side, PJM estimated the failure rate under the Revised FTR Credit Requirement with both a 99% confidence interval and a 97% confidence interval, as well as the resulting collateral shortfalls.[63] As explained above, the failure rate refers to the frequency with which the collateral posted under the Revised FTR Credit Requirement failed to cover an FTR Market Participant's losses on its portfolio. The shortfall refers to the dollar gap between that posted collateral and those portfolio losses. Generally speaking, an HSIM model with a 99% confidence interval is expected to have a failure rate of about 1%, and an HSIM model with a 97% confidence interval is expected to have a failure rate of about 3%. PJM's back-testing has confirmed these expectations for PJM's HSIM model.[64] Comparing PJM's shortfall estimates, the HSIM model with a 97% confidence interval resulted in an

[63] Drauschak Aff. at 11.

[64] Drauschak Aff. at 11; Eydeland Aff. at 13.

additional yearly shortfall of $27.5 million, relative to that produced by the HSIM model with a 99% confidence interval.[65]

That shortfall amount, however, does not mean that Members must pay the cost of a $27.5 million default. The shortfall at issue here is only the difference between FTR Participants' portfolio losses and their collateral resulting specifically from the Revised FTR Credit Requirement. The cost to Members depends on how much of that shortfall results in an FTR Participant payment default (which Members effectively cover through the default allocation assessment). While the precise numeric relationship between collateral shortfalls and defaults is difficult to predict, Ms. Drauschak explains that "it is safe to say that shortfalls…are much more common" than defaults.[66] She cites, for example, the fact that PJM observed "failure rates," i.e., instances when portfolio losses exceed the collateral required by the FTR Credit Requirement, of around 8% and 11% under the current rules.[67] By contrast, she notes, FTR payment defaults "are infrequent, although, because PJM strives to avoid any payment defaults, each one that occurs is highly notable."[68] Therefore, "[t]o reflect the generally low incidence and extent of payment defaults relative to FTR payment defaults, PJM used both a 5% and 10% factor to relate default amounts to shortfall amount."[69] Because this percentage relationship is uncertain, PJM also derived the percentage value "at which a net benefit would become a net cost."[70] The 81% value is

[65] Drauschak Aff. at 18.

[66] *Id*. at 16.

[67] *Id.*

[68] *Id.*

[69] *Id.* at 16-17.

[70] *Id*. at 17.

simply the calculated percentage of the $27.5 million shortfall that corresponds to the $22.4 million low estimate of Members' cost to fund the incremental collateral that would be required if PJM used a 99% confidence interval.[71]

With a more plausible estimate that the resulting payment default would equal 10% of a shortfall in collateral under the Revised FTR Credit Requirement, Members' aggregate benefit of $2.7 million in avoided default allocations is well below the $22.4 million low estimate of their aggregate cost of funding the additional collateral, as shown in Figure 1 above and in Exhibit D to Ms. Drauschak's affidavit. If Members' cost to obtain and maintain collateral is higher than PJM's low estimate of that cost, even if still well below the cost in PJM's high estimate, the costs of employing a 99% confidence interval would even more greatly exceed its benefits.

In short, PJM's cost-benefit analysis found that the *cost* (in the form of increased cost of funds for deployed collateral) to individual Members from using a 99% confidence interval (rather than a 97% confidence interval) in the Revised FTR Credit Requirement is likely to exceed the *benefit* to them (in the form of avoided cost of default allocation assessments) of using that higher confidence interval.

Like any cost-benefit analysis, this specific comparison employs assumptions that can vary. The collateral required by the Revised FTR Credit Requirement, for example, will vary in time; comparing the collateral requirement results from a 97% confidence interval versus those from a 99% confidence interval likewise will vary over time. Most significantly, the financial cost to maintain collateral depends on current interest rates. The

[71] Drauschak Aff. at 18. M. Drauschak observes that this 81% value "is far above any relation between shortfalls and payment defaults PJM has experienced to date." *Id.* at 17.

relevant LIBOR rates, for example, have increased by about 60 basis points since the March 25, 2022, published rates PJM used in this analysis.[72] That factor alone, by raising the cost of obtaining and maintaining the funds used as collateral, would further skew the cost-benefit comparison against use of a 99% confidence interval.

b. The increased collateral required by a 99% confidence interval falls disproportionately on FTR Participants that serve load

PJM's cost/benefit analysis estimated not only the overall impacts of using a 99% confidence interval, but also the impacts on each sector. PJM thus estimated the collateral financing costs and the default allocation avoidance benefits separately for End-Use Customers, Electric Distributors, Generation Owners, Transmission Owners, and Other Suppliers. PJM further divided the Other Suppliers sector into Load Serving Entities, Financial Traders, and remaining Other Suppliers.[73]

PJM's analysis showed that the capital costs of the increased collateral from using a 99% confidence interval exceeded the benefits of using a 99% confidence interval for every one of these sectors, as shown in Figure 1 above and in Ms. Drauschak's affidavit.[74]

PJM's sector analysis also shows that FTR Participants that serve load will bear a disproportionate share of the extra collateral that use of a 99% confidence interval would require. More specifically, as shown in Ms. Draushak's affidavit and in Figure 2 below,

[72] Drauschak Aff. at 15-16.

[73] That division within the Other Suppliers sector was based on participants' self-identification of their line of business, as reflected in PJM's membership records.

[74] Drauschak Aff. at 19 (comparing the benefit that assumes 10% of collateral shortfalls will result in payment default against the low estimate of the cost to fund additional collateral required by a 99% confidence interval). The break-even percentage would differ by sector, since the 81% value was calculated on an aggregate basis.

using a 99% confidence interval increases the collateral required from all sectors by 48.0%.[75] Every sector that includes Members that serve load sees a larger percentage increase in their collateral requirement from using the 99% confidence interval. The sub-set of the "Other Suppliers" sector that self-identify as load serving entities sees a higher, i.e., 55.3% increase, in their required collateral from use of the 99% collateral increase. The other sectors that include load serving entities, i.e., the Electric Distributor, Generation Owner, and Transmission Owner sectors, see much higher increases in their required collateral as a result of using the 99% confidence interval, i.e., increases of 57.5%, 63.0%, and 114.1%, respectively.

Figure 2

Change in Required Collateral

			$ Change	% Change
Dollars in millions	Collateral – 97% CI ♦	Collateral – 99% CI ♦	Moving From 97% CI to 99% CI ♦	Moving From 97% CI to 99% CI ♦
Electric Distributor	$46.4	$73.1	$26.7	57.5%
Generation Owner	$104.6	$170.5	$65.9	63.0%
Transmission Owner	$43.4	$92.9	$49.5	114.1%
Other Supplier ●	$1,026.2	$1,469.4	$443.2	43.2%
Load Serving Entity	$180.5	$280.3	$99.8	55.3%
Financial Trader	$619.0	$856.0	$237.0	38.3%
Other Supplier	$226.7	$333.1	$106.4	46.9%
Total ■	**$1,220.6**	**$1,805.9**	**$585.3**	**48.0%**

♦ Confidence interval
■ Data utilized for the FTR Credit Filing at FERC (December 2021).
● Line of business based on member self-identification in membership records.

Electric Distributors and Transmission Owners serve a significant amount of load as well as some Generation Owners.

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By contrast, the groups that see below-average collateral increases as a result of the 99% confidence interval generally do not serve much load. Specifically, the Members within

75 Drauschak Aff. at 19.

the Other Suppliers sector that self-identify as Financial Traders or as a residual group of Other Suppliers that generally is comprised of power marketers, see required collateral increases of 38.3% and 46.9% from use of the 99% confidence interval.[76]

2. Additional analysis demonstrates that the revised FTR Credit Requirement with its 97% confidence interval will greatly reduce i) how often FTR Portfolio Losses exceed the FTR Credit Requirement collateral, and ii) the dollar amount by which those losses exceed that collateral

PJM has supplemented its previous analyses of the "failure rate," i.e., how often FTR portfolio losses are expected to exceed the collateral required by the FTR Credit Requirement, and the "shortfall," i.e., the aggregate dollar amount by which those losses are expected to exceed that collateral. That analysis underscores that the HSIM with a 97% confidence interval greatly improves on the status quo and meets the standard articulated by the February 28 Order of requiring collateral that is reasonably calibrated to address the risks of portfolio losses.[77]

Back-testing the HSIM model, as PJM explained in the December 2021 Filing, involves applying the proposed new credit rules to a past period to estimate i) how much collateral would have been required for one or more past auctions; and ii) how often portfolio losses, based on known historic pricing, would have exceeded the required collateral. In the December 2021 Filing, PJM reported that it "back-tested results for 10,724 zonal path prices" and found only 139 failures, "indicating a failure rate of .013," i.e., 1.3%.[78] By contrast, PJM's back-testing indicated a potential market failure/loss rate for the current

[76] Drauschak Aff. at 20.

[77] February 28 Order at P 33.

[78] December 21 Filing at 33 (citing and quoting ER22-703 Eydeland Aff. at 12).

effective FTR Credit Requirement of 8%.[79]

PJM supplemented this analysis in light of the February 28 Order. Specifically, PJM estimated the collateral that would have been collected for i) the February 2022 FTR Auction; and ii) the March 2022 FTR Auction, if the Revised FTR Credit Requirement had been in place for each of those auctions, and compared that collateral against the gains and losses the portfolios obtained through the auction actually experienced.

For the February 2022 FTR Auction, PJM's analysis determined that the failure rate under the current FTR Credit Requirement was 11.7%, and resulted in a shortfall (where the shortfall represents the actual settled losses over the FTR Credit Requirement) of $41.7 million.[80] By contrast, PJM's back-testing estimated that the failure rate under the Revised FTR Credit Requirement would have been 3.6% (i.e., 11 failures over 308 portfolios); and the shortfall would have been only $2.3 million.[81]

For the March 2022 FTR Auction, PJM found that the failure rate under the current effective FTR Credit Requirement was 11.3% (i.e., 34 failures over 301 portfolios); and that the shortfall was $3.1 million.[82] By contrast, PJM's back-testing estimated that the failure rate under the Revised FTR Credit Requirement would have been 3.0% (i.e., 9 failures over 301 portfolios); and the shortfall would have been only $0.6 million.[83]

Importantly, the back-testing shows these reductions in the estimated shortfall (94%

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[79] *FRMSTF Phase II – Bid and Initial Margining Update*, PJM Interconnection, L.L.C. (July 16, 2021), https://www.pjm.com/-/media/committees-groups/task-forces/frmstf/2021/20210716/20210716-item-03-frmstf-phase-ii-bid-and-initial-margining.ashx.

[80] Drauschak Aff. at 12 and Exh. A.

[81] *Id.*

[82] *Id.*

[83] *Id.*

lower from the February auction and 80% lower from the March auction) from using the Revised FTR Credit Requirement *even though* the Revised FTR Credit Requirement would yield much lower overall collateral than the status quo rules. For the February auction, the credit requirement under the proposed rules would be about $448 million lower (or about 26% lower) than under the current effective rules.[84] For the March auction, the credit requirement under the proposed rules would be about $619 million lower (or about 39% lower) than under the current effective rules.[85] In other words, the Revised FTR Credit Requirement is much more tailored than the status quo rules to protect against the risk of FTR Participant payment defaults due to FTR portfolio risk. Or, to put it in terms of the standard articulated by the February 28 Order, the Revised FTR Credit Requirement will result in collateral that is *reasonably calibrated* to address that FTR portfolio risk—dramatically more so, when compared to the current effective rules.

With the additional back-testing and cost/benefit analyses for the Commission has ample evidence to find that PJM's proposal, when weighed as to both its effectiveness and costs, is a just and reasonable replacement for the status quo consistent with the Commission's section 205 standard of review.

3. The 97% confidence interval is not driving the collateral reduction (relative to the status quo) highlighted by the February 28 Order.

The February 28 Order found that PJM "failed to demonstrate that its proposed FTR Credit Revisions are reasonably calibrated to ensure that market participants will be required to provide adequate collateral relative to the risks of their positions."[86] The Commission

[84] Dauschak Aff. at 13.

[85] *Id.*

[86] February 28 Order at P 33.

found that "[t]he record establishe[d] that PJM's proposed 97% confidence interval would result in a reduction in market participants' aggregate collateral commitments relative to the existing FTR Credit Requirement."[87] Given this reduction in collateral, the Commission found that "the lack of support regarding how the HSIM model used at a 97% confidence interval establishes reasonably calibrated collateral levels for riskier portfolios means that PJM has not met its burden to show that the FTR Credit Revisions are just and reasonable."[88]

In the wake of the February 28 Order, PJM analyzed the collateral reduction from the status quo estimated for the Revised FTR Credit Requirement, which was observed both for an HSIM with a 97% confidence interval and an HSIM with a 99% confidence interval. PJM found that the collateral reduction *was not* driven by the choice of a 97% confidence interval.[89] The Revised FTR Credit Requirement's reduction in collateral, relative to the status quo, was instead driven by the elimination of the undiversified adder and the proposal to allow positive MTA adjustments to reduce the FTR Credit Requirement.

Moreover, given the substantial reductions in failure rates and shortfalls achieved by the Revised FTR Credit Requirement compared to the status quo, the reduction in collateral associated with these two drivers is not exposing PJM and Members to an increased exposure to FTR portfolio losses. Rather, those collateral changes reflect credit rules that more carefully tailor collateral requirements to the risk of market losses from FTR portfolios.

Based on PJM's back-testing of the Revised FTR Credit Requirement to the February 2022 and March 2022 Auctions, two of the proposed Tariff changes stand out as the source

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[87] *Id.*

[88] *Id.*

[89] Drauschak Aff. at 23.

of reductions in collateral relative to the current FTR Credit Requirement. Figures 3 and 4 below, copied from Exhibit to Ms. Drauschak's affidavit, show the results of PJM's identification of the causes of the collateral reductions seen from back-testing the February 2022 and March 2022 FTR auctions. Each bar chart shows the collateral required by the current effective Tariff, and then shows which components of the Revised FTR Credit Requirement add to collateral, and which components reduce collateral, finally resulting in the bar at the right reflecting the collateral that would be required by the Revised FTR Credit Requirement using a 97% confidence interval. As can be seen, elimination of the undiversified adder reduces collateral by $894 million in the February 2022 auction back-test and by $841 million in the March 2022 auction back-test. Allowing the FTR Credit Requirement to be decreased when the MTA value is positive reduces collateral by $848 million in the February 2022 auction back-test and by $661 million in the March 2022 auction back-test.

Figure 3

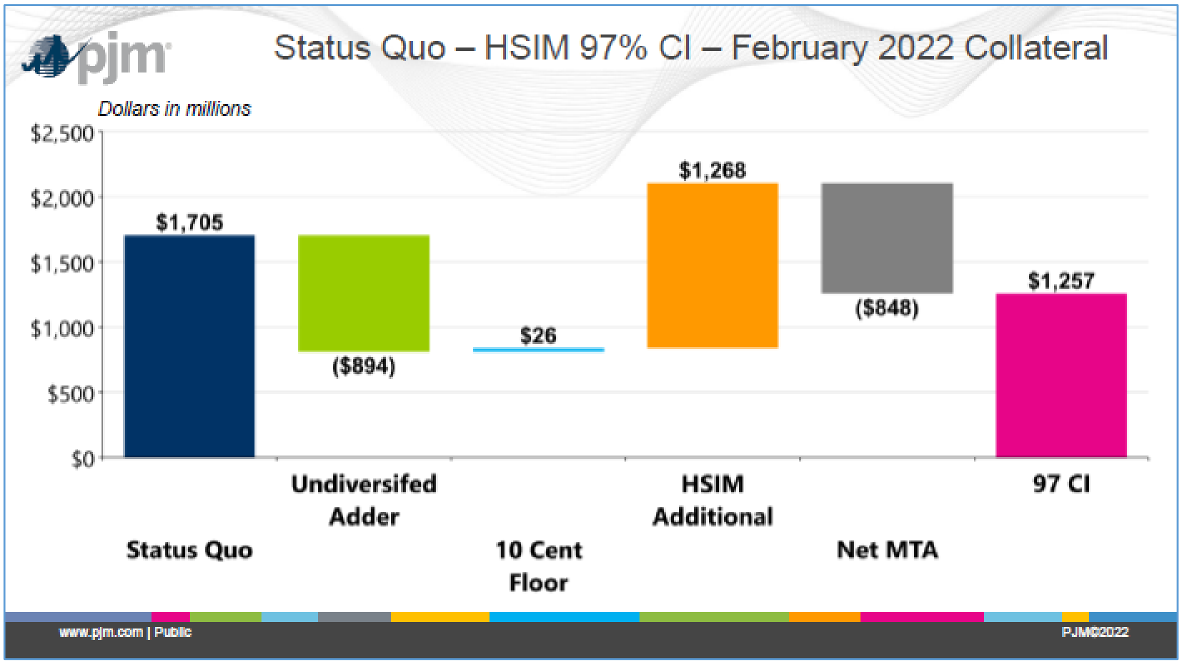
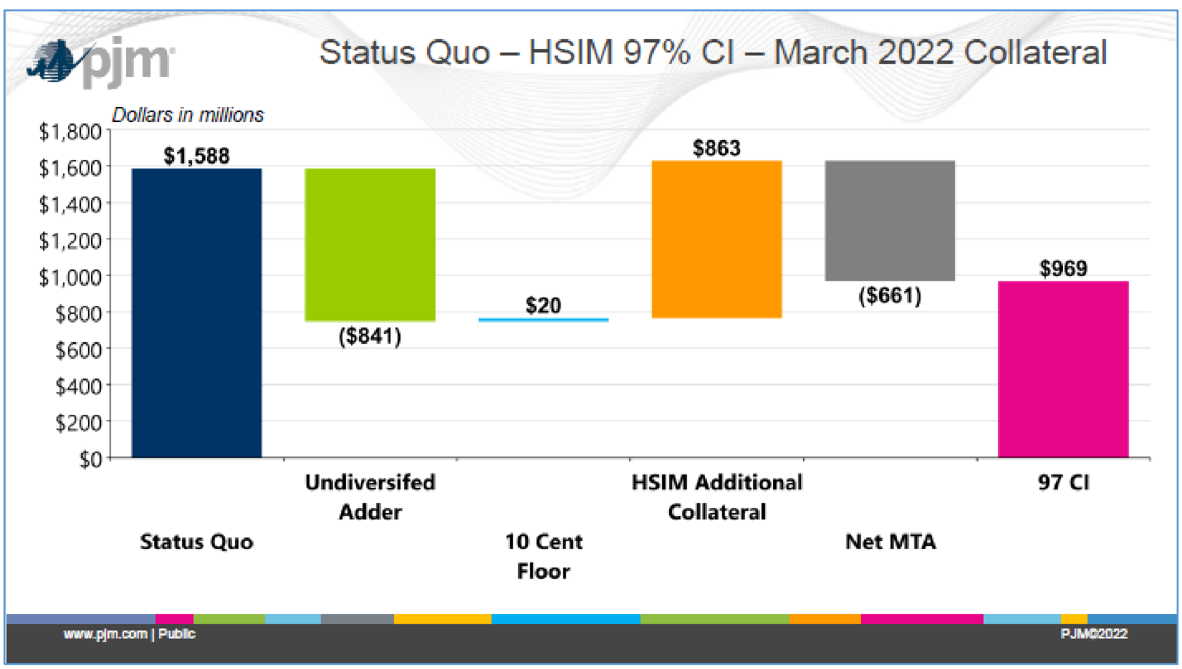


Figure 4



4. The collateral reductions from elimination of the undiversified adder and allowing the FTR Credit Requirement to be reduced when MTA value is positive do not expose PJM or its Members to increased risk.

The back-test results noted in the prior subsection raise the question of whether these two proposed Tariff changes increase PJM's and its Members' exposure to FTR participant payment defaults from FTR portfolio risks. They do not. PJM and its Members are protected from portfolio risks by the Revised FTR Credit Requirement's dramatic reduction in the failure rate—which directly measures the exposure to portfolio risk. The added collateral required by the status quo rules, including the undiversified adder and the failure to consider positive MTA reductions in risk, is not helping reduce the failure rate.

The experts that prepared the GreenHat Report recommended removal of the undiversified adder component of the FTR Credit Requirement precisely because it is not correlated with market risk, and therefore is less likely to require collateral that is reasonably calibrated to protect against the risks of default due to FTR portfolio losses.[90] The disconnect found in PJM's back-testing between the extra collateral required by this rule and the higher failure rate of the status quo rules dramatically illustrates the point made by those experts—the collateral required by the undiversified adder is not well correlated with the market risk from the FTR paths that comprise a participant's portfolio. Notably, commenters supported elimination of the undiversified adder when PJM proposed it in the December 2021 Filing.[91] And the February 28 Order expressly cited the undiversified adder as part of its rationale for why the current effective FTR Credit requirement might be unjust and unreasonable.[92]

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[90] GreenHat Report at Appendix page 1 (Recommendation A).

[91] February 28 Order at P 40.

[92] *Id.* at P 36.

Accordingly, it is reasonable to eliminate the undiversified adder, and it should not be retained solely because it requires FTR Participants to post more collateral, regardless of whether that collateral is correlated to the market risks of FTR portfolios.

Similarly, allowing the FTR Credit Requirement to be reduced when the MTA value is positive will by definition reduce collateral relative to the status quo rules, because those current rules allow MTA adjustments *only* when they *increase* collateral. Despite its collateral reduction impact, this Tariff change does not increase risk and does not prevent the Revised FTR Credit Requirement from reasonably calibrating collateral requirements to protect from FTR portfolio risks. Specifically, this Tariff change appropriately recognizes that an FTR portfolio containing FTRs that have become more highly valued than they were at the time they were transacted has thereby seen an incremental reduction in the portfolio's market risk exposure. It is reasonable, and consistent with the risk calibration objective cited by the February 28 Order, to allow a downward adjustment to collateral to reflect that incremental reduction in the portfolio's risk exposure.

5. Independent auditors validated the HSIM model that includes use of a 97% confidence interval.

PJM explained in the December 2021 Filing that it had submitted the HSIM model to the consulting firm of KPMG for validation, and noted that the version submitted used a 99% confidence interval, which PJM added did not affect the validation's assurance that the model operated as intended.[93] The February 28 Order raised concern, however, that "[v]alidating the HSIM model under conditions different from how PJM proposes to use it, i.e., at a 99% confidence interval rather than a 97% confidence interval, does not demonstrate

[93] December 2021 Filing at 33-34.

whether the HSIM model would operate as represented across extreme events or that the initial margin estimates would cover losses as expected."[94]

To address this concern, PJM requested KPMG to validate the version of the HSIM model that uses a 97% confidence interval. As can be seen from KPMG's summary report in Attachment G to Ms. Drauschak's affidavit, KPMG found that "[t]he overall results have demonstrated that the IM methodology historically behaves as expected under 95%, 97%, and 99% confidence intervals."[95]

6. The revised FTR Credit Requirement is not designed or intended to address the factors that apparently contributed to a recent default by an FTR Participant; PJM is addressing that issue outside this proceeding.

In finding that PJM had not met its burden to show that the Revised FTR Credit Requirement is just and reasonable, the Commission "particularly" noted "the significant recent defaults involving the FTR market,"[96] which the order elsewhere describes as the GreenHat default and "a recent default from Hill Energy that is an open liability."[97]

While the Revised FTR Credit Requirement is an outgrowth of the comprehensive review, investigation and development of PJM FTR and credit reforms that followed from the GreenHat default,[98] these Tariff changes are intended and designed to address the distinct issue of FTR *portfolio* risk, as opposed to FTR *participant* risk.

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[94] February 28 Order at P 32.

[95] Drauscak Aff. at Exhibit F.

[96] February 28 Order at P 33.

[97] *Id.* at P 33 n.60.

[98] *See, e.g.*, December 2021 Filing at 34.

Portfolio risk refers to the risk that market conditions, such as the actual cost of congestion on FTR paths purchased in an auction, will be such that the FTR Participant suffers a substantial loss on the FTRs it purchased. The Revised FTR Credit Requirement addresses precisely that risk, by modeling, and assigning probabilities to, the full range of portfolio gain and portfolio loss scenarios that are derived from historic data on relevant PJM market prices.

Participant risk refers to the risk that a particular participant will prove incapable of meeting its obligations in the PJM market, due to financial strength (or lack thereof) specific to the participant. Not surprisingly, PJM has multiple tools to assess and mitigate participant risk, including "'Know Your Customer' reforms, restricted timelines for collateral call payments, enhanced material adverse change language, required audited financials, the implementation of financial models, the addition of unreasonable credit risk as a basis for collateral calls, and the ability to limit and suspend market participation."[99]

7. The February 28 Order's concerns about the potential disruption of using a 99% confidence interval are avoided because this filing proposes a 97% confidence interval.

The February 28 Order raises concerns with the possible disruptions to FTR Participants from using a 99% confidence interval in the HSIM model.[100] This filing moots that concern, since PJM is not proposing to use a 99% confidence interval. PJM also notes that, since February, 2022, it has made available to FTR Participants calculations of their

[99] Drauschak Aff. at 24.

[100] February 28 Order at P 34.

collateral that would be required under the HSIM model with a 97% confidence interval, to help them prepare for the implementation of the Revised FTR Credit requirement.

8. The revised FTR Credit Requirement remedies the limitations in the current effective Tariff that PJM identified in the December 2021 Filing. The February 28 Order's remaining concern with the current Tariff, i.e., protection against the riskiest participants, should be addressed in the Section 206 proceeding after the Commission acts on this filing.

The February 28 Order found, based on the December 2021 Filing's description of limitations in the current FTR Credit Requirement, that PJM's current Tariff may be unjust and unreasonable.[101]

The Revised FTR Credit Requirement remedies all of the limitations of the current effective FTR Credit Requirement that PJM identified in the December 2021 which the February 28 Order cited as the basis for opening a section 206 investigation. As shown in this filing, the justification for this Revised FTR Credit Requirement is more clearly demonstrated in this filing, relying on additional evidence and analyses, including the cost/benefit analysis, that were not available at the time of the December 2021 filing. Accordingly, Commission acceptance of this filing should resolve any concern that the current effective FTR Credit Requirement may be unjust and unreasonable and avoid perpetuating the current FTR Credit Requirements that the February 28 Order found might be unjust and unreasonable.

That still leaves one potential issue, however. The Revised FTR Credit Requirement, like the FTR Credit Requirement it proposes to replace, is designed to measure and protect against the risks that arise from FTR portfolios. It is not intended or designed to address the

[101] February 28 Order at P 35.

distinct source of risk, as described above, arising from FTR Participants themselves, which PJM currently addresses using the multiple Tariff tools cited above. Thus, this filing does not address concerns raised by the February 28 Order about "the riskiest market participants,"[102] although, as quoted above, Ms. Drauschak summarizes PJM's current tools for addressing participant-specific risks. This remaining concern, beyond participant-specific risks, also implicates the "tail risk" that is associated with any version of the FTR Credit Requirement that has a non-zero failure rate, whether that is about 11% (for the current FTR Credit Requirement), about 3% (for an HSIM with a 97% confidence interval), or about 1% (for an HSIM with a 99% confidence interval).

PJM therefore views that concern as appropriately addressed in the section 206 proceeding opened by the February 28 Order. The Commission should not attempt to address "the riskiest market participant" or tail risk concerns before it acts on this filing, since Commission action on this filing should narrow the issues by resolving the "limitations" in the current FTR Credit Requirement that the February 28 Order cited as indicating those current Tariff provisions may be unjust and unreasonable. Beyond that, the Commission should keep the section 206 proceeding open, but await the outcome of PJM's stakeholder process on the riskiest Market Participant and tail risk concerns, to allow PJM and its stakeholders an opportunity to address these more narrowly focused concerns.

To that end, PJM is concurrently filing a motion to hold the section 206 proceeding in abeyance, as the February 28 Order itself suggested.[103]

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[102] *Id.* at 33.

[103] February 28 Order at P 38.

D. Additional Showings that the Revised FTR Credit Requirement Is Just and Reasonable

While the showings discussed above address and resolve all concerns raised in the February 28 Order regarding support for the Revised FTR Credit Requirement, PJM's demonstration that these Tariff changes are just and reasonable is not limited to those showings. PJM sets forth in this section II.D its other evidence that the Revised FTR Credit Requirement is just and reasonable.

1. PJM reasonably bases its revised FTR Credit Requirement on an HSIM-based margin approach.

In general, margin is the amount of financial collateral deposited by a Market Participant with a market operator or administrator to collateralize trade exposures introduced by the participant.[104] Such margins are the first line of defense in the event of the Market Participant's default, to satisfy the financial obligations of that participant.[105] The margins are designed to cover the market risk of a Market Participant's portfolio with high level of confidence.[106]

The GreenHat Report recommended that PJM adopt this type of approach to determine the collateral needed from FTR Market Participants to mitigate FTR portfolio risk.[107] In this regard, the GreenHat Report referred to two types of margin, i.e., "Original Margin," which is collateral required to address the forward value risk of the transaction at

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[104] Eydeland Aff. at 2.

[105] *Id.* at 2-3.

[106] *Id.* at 3.

[107] GreenHat Report at Appendix page 1 (Recommendation A).

the time of execution, and "Variation Margin," which refers to collateral changes to address periodic changes in the forward value of the open transaction.[108]

Initial margin, another term for Original Margin, is the amount of collateral needed to cover the replacement cost of unwinding a Market Participant's portfolio in the case of default. Those replacement costs of unwinding a portfolio "is the cost incurred during the liquidation period," which is "the time period between the last variation margin posting and the complete portfolio closeout time,"[109] and which also is known as the margin period of risk.[110] The posted deposit thus represents the potential losses that would be incurred should a participant default "calculated with a high degree of statistical likelihood across a participant's portfolio."[111]

As Dr. Eydeland explains, many approaches to calculating the risk exposure addressed by initial margin include two critical elements: (1) a model that produces a probability distribution of different potential exposure values; and (2) a choice regarding the specific level of the "high degree of statistical likelihood," as noted by Dr. Eydeland,[112] of the potential losses that would be incurred if the participant defaults. For the first, PJM proposes an HSIM model; for the second, PJM proposes a 97% confidence interval. PJM also proposes to specify in the Tariff the method PJM will use to weigh the initial margin calculations for individual months when PJM calculates an initial margin value for a multi-

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[108] GreenHat Report at Appendix page 1 (Recommendation A.

[109] Eydeland Aff. at 3.

[110] *See id.* at 6.

[111] *Id.* at 3.

[112] Eydeland Aff. at 3.

month Balance of Planning Period ("BOPP"). PJM discusses each of these Tariff-specified elements of the initial margin calculation in the following three sections of this transmittal.

a. HSIM model

i. PJM's planned implementation of an HSIM model

PJM proposes to memorialize in the Tariff that PJM will use an historical simulation methodology to calculate initial margin.[113] As Dr. Eydeland explains, the "HSIM approach can be categorized as a [value-at-risk ("VaR")]-based methodology that is widely accepted in different markets for calculating initial margin and other capital requirements."[114] As applied here, the HSIM model will use "[FTR auction] historical data to assess the impact of market moves on a given participant's portfolio."[115] Specifically, the participant's portfolio "is subjected to historically recorded [FTR] price movements over a specified time period called the margin period of risk," thus generating "a distribution of the portfolio value changes," which "is then used to calculate the maximum loss corresponding to a fixed confidence level."[116] That maximum loss value then "determines the initial margin."[117]

PJM's HSIM model will use FTR auction data from 2008 to the most recent auction to determine the distribution of a participant's portfolio value over the margin period of risk.[118] The HSIM model will perform separate calculation adjustments for monthly, annual, and long-term FTR auctions.

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[113] *See* proposed Tariff, Attachment Q, section VI.C.2.a.i.

[114] Eydeland Aff. at 5.

[115] *Id.*

[116] *Id.*

[117] *Id.*

[118] *Id.* at 5.

For PJM's implementation of an HSIM model, the margin period of risk is the time period from the end of an FTR auction to the time PJM anticipates it would be able to liquidate a defaulted FTR transaction or position, by selling the FTRs back into the auction. Because PJM FTR auctions occur both monthly and annually, the margin period of risk is therefore two auction periods.[119]

ii. Advantages of a HSIM model

Dr. Eydeland lists the advantages of the proposed HSIM model as including "that it is a standard risk-based approach used in a majority of markets, it is easy to implement, it is a transparent process with a low probability of dispute, and there is no need to determine correlations between paths as they naturally are included in the historical data."[120] Elaborating on the latter point, Dr. Eydeland explains that, "[u]nlike alternative, theoretical-based, approaches to determining initial margin, that require calculation of correlation coefficients (which can be challenging) the HSIM approach is free from this intermediate step and uses historical data directly to determine the joint distribution of underlying risk factors."[121]

Accordingly, an HSIM model is particularly effective in managing FTR portfolio risk because it "uses real data," and "can capture unexpected events and correlations that would not necessarily be predicted by a theoretical model."[122] The proposed HSIM model

[119] Drauschak Aff. at 9.

[120] Eydeland Aff. at 5.

[121] *Id.* at 5-6.

[122] *Id.* at 6.

therefore "allows one to model a complex joint behavior of various risk factors that impact portfolio values, making it a very effective tool in evaluating and managing risk."[123]

In sum, as Dr. Eydeland confirms, "PJM's implementation of the HSIM model will help prevent under-collateralization in PJM markets."[124]

iii. The HSIM model better uses relevant available data to support a better assessment of financial risk.

PJM used actual FTR auction path and price data from its monthly and annual FTR auctions from 2008 through 2022 in the development of its HSIM model. Although the actual number of auctions during such time period is relatively small, the inputs nevertheless represent thousands of data points. For every year, there are 12 monthly auctions that are conducted from May of the current year to April of the next year. The first auction in May covers all 12 months: June – May the second auction covers 11 months: July – May, and so on. For example, FTR contracts bid in the August 2020 auction in July included the months of Aug2020, Sep2020, Oct2020, Nov2020, Dec2020, Jan2021, Feb2021, Mar2021, Apr2021, and May2021.

Moreover, under the proposed HSIM model, PJM will add data points to the model following each successive FTR auction, increasing the model's data population as subsequent auctions are held—which is a notable improvement over the current approach of using only the most recent three years at any given time. In addition, under this approach, new participants in PJM's FTR markets will benefit from the developing history of pricing the FTR paths that are included in the HSIM model, and will not be disadvantaged by the

[123] *Id.*

[124] *Id.*

need to establish a history at PJM.

iv. PJM's adoption of the HSIM model is consistent with recognized standards for initial margin models.

PJM's decision to adopt the HSIM model was based, in part, on consideration of the same factors considered by the International Swap and Derivatives Dealers Association, Inc. ("ISDA") in adopting its protocols for its Standards for Initial Margin Model for Non-Cleared Derivatives. These nine factors (with limited exception) were considered and adopted by PJM in the development of its HSIM model. The ISDA standards determined that initial margin models should have to following factors: (1) non-procyclical or margins are not subject to continuous change; (2) ease of replication; (3) transparency; (4) quick to calculate; (5) extensible (or conducive to addition of new risk factors); (6) predictability; (7) reasonable costs; (8) governance; and (9) margin appropriateness.[125]

No.	Criteria	PJM 's Adoption of Principle in HSIM Model
1	Non-procyclical	Initial margin has shown to be a relatively stable risk mitigation tool as applied to an individual FTR Market Participant over time, provided that an FTR Market Participant's portfolio does not change substantially.
2	Ease of replication	Initial margin calculations are relatively easy to replicate by or for a particular FTR Market Participant, given the same data inputs and portfolio of positions, such that FTR Market Participants should be able to validate and anticipate the model output.
3	Transparency	Such calculation transparency builds confidence in market risk management and enables effective dispute resolution.
4	Quick to calculate	The ability to quickly calculate initial margin, as well as to re-run and validate the calculations as needed by FTR Market Participants, enables more efficient management of the margining process.

[125] *ISDA Standard Initial Margin Model (SIMM™) for Non-Cleared Derivatives*, International Swaps and Derivatives Association, Inc., 3 (Dec. 2013), https://www.isda.org/a/4AiDE/march-26-simm-for-non-cleared-paper-appendix.pdf (discussion of the nine criteria that a standard initial margin model should satisfy).

5	Extensible	Use of the model approach will make it easier to add or revise new data points, and new default scenarios or risk factors, if necessary or as required by regulators.
6	Predictability	Enables predictability of initial margin to allow FTR Market Participants to allocate capital to specific transactions or to aggregated portfolio positions
7	Costs	Initial margin does not create unreasonable barriers of entry to qualified FTR Participants
8	Governance	Adoption of HSIM was subject to PJM Stakeholder engagement and is subject to FERC regulation.
9	Margin appropriateness	The HSIM model will be used as a tool to compute the initial margin component of the FTR Credit Requirement. The FTR Credit Requirement incorporates other elements to address risk factor offsets.

a. Confidence interval

The HSIM model produces a distribution of possible changes in portfolio value (which could be an increase or a decrease from the beginning value) over the margin period of risk. By itself, that distribution does not dictate how much protection an initial margin will provide against risk of loss. The other critical element of the analysis, therefore, is a choice about the degree of protection, i.e., the degree of statistical certainty that the level of the initial margin will exceed the amount of a loss in portfolio value over the relevant period. The confidence interval is the metric for expressing that desired level of statistical certainty.

The Revised FTR Credit Requirement employs a 97% confidence interval, which provides PJM and Members with an increased level of protection. As shown above in section II.C.2, the Revised FTR Credit Requirement with a 97% confidence interval will result in a failure rate of about 3%, which is a large improvement over the failure rate of approximately 11% under the current effective FTR Credit Requirement. As also shown in section II.C.2, the Revised FTR Credit Requirement with a 97% confidence interval is projected, based on back-testing, to reduce collateral shortfalls due to FTR portfolio losses by as much as 80-90% compared to the current effective FTR Credit Requirement.

As discussed in section II.C.1.a above, PJM's analysis conducted in response to the February 28 Order found that the incremental cost to Members for the additional collateral that would be required if the confidence interval were increased from 97% to 99% likely exceeds the incremental benefit to Members from the further reduction in payment defaults due to FTR portfolio losses that a 99% confidence interval would provide.

For these reasons, using a 97% confidence interval is just and reasonable.

b. Weighting for individual months in the balance of planning period

PJM also is including in the proposed Tariff language that the HSIM model will be "subject to a weighted aggregation method that is represented by a straight sum for long term positions and a combination of straight sum (20%) and weighted root sum of squares (80%) for balance of planning period positions."[126]

This weighting concerns how to aggregate the initial margin values calculated for individual months into an initial margin value for a multi-month BOPP. There are two alternative weighting calculations, depending on whether the monthly results are expected to be correlated. At one extreme, if the months in a BOPP are perfectly correlated, then the BOPP initial margin would simply be the straight sum of the initial margins calculated for each month during the BOPP. Conversely, if the months are expected to be entirely uncorrelated, then the BOPP initial margin would be the square root of the sum of the squares

[126] Tariff, Attachment Q, section VI.C.2.a.i.

of the individual monthly initial margin values.[127] PJM's expected experience (like most real-world applications) will fall somewhere in between these two outer bounds. Accordingly, a reasonable approach is to perform both calculations, but then weight them to reflect an appropriate balance.

As Dr. Eydeland explains, PJM's selection of an 80%/20% weight "is supported by the back-test results."[128] More specifically, "[d]ifferent weights were tested, and 80%/20% was the one that satisfied the target failure rate at the lowest collateral cost." The failure rate refers to how often in the back-testing the simulated portfolio losses over the margin period of risk exceeded the specified initial margin level. Different weighting of the individual months in a BOPP will result in different portfolio value losses over the BOPP, and thus different failure rates. Since PJM proposes to use a 97% confidence interval, the expected failure rate is 3%, so a reasonable weighting of the individual months in the BOPP would result in a failure rate that approaches, but does not exceed, 3%. The 80/20 split fits that scenario here; as Dr. Eydeland summarizes, the selected weighting was "determined to achieve an optimal balance between the collateral costs to the participants and the attainment of the risk management goals."[129]

2. The revised FTR Credit Requirement does not create unreasonable barriers to entry.

PJM's adoption of the revised methodology to calculating FTR Credit Requirements and, in particular, use of the HSIM model and the 97% confidence interval, does not present

[127] *See* Eydeland Aff. at 10.

[128] *Id.*

[129] *Id.*

unreasonable barriers to entry into PJM's FTR markets. As Ms. Drauschak explains, "the revised FTR Credit Requirement will not prevent parties from participating in the PJM FTR market, it will only better reflect the risks presented by the particular FTR paths they choose to obtain in the auctions."[130]

Thus, the change in methodology improves PJM's risk management process, allowing entry, but preventing certain Market Participants from taking on too much market risk, for which the FTR Market Participant cannot, or chooses not to, post adequate initial margin. Therefore, the new initial margin rules increase collateral for some FTR Market Participants only when the methodology calculates that such FTR Market Participant's positions may represent unreasonable credit risk to PJM and PJM's Members.

Under the Revised FTR Credit Requirement, all FTR Market Participants are on a level playing field based on their risk profile to the PJM Markets and their risk tolerance for posting initial margin to increase their FTR portfolio. The Revised FTR Credit Requirement enhances PJM's ability to manage risk, and thus serves PJM's goal of protecting its markets against unreasonable credit risk, protecting smaller participants and load serving PJM Members with no other means to mitigate the risk of significant market losses they may incur from another FTR Market Participant's default in the PJM FTR market.

It is PJM's obligation to be the PJM Market gatekeeper, to be the market risk manager, and to protect PJM Members and their customers and end use energy consumers from the risks that an FTR Market Participant default may result in losses in excess of the initial margin collected from FTR Market Participants. Default by an FTR Market

[130] Drauschak Aff. at 22.

Participant, particularly a default that results in a material loss to the market, does not just potentially result in a loss to that FTR Market Participant. It potentially results in a loss to PJM Members who are at risk for default allocation assessments but who are not active participants in the FTR markets, and thus otherwise are not accustomed or oriented to assessing or managing FTR portfolio risks. It is those PJM Members that look to PJM to manage and mitigate their risks by collecting an appropriate amount of initial margin using the FTR Credit Requirement to support ongoing FTR market activity. This proposal is just and reasonable in advancing that objective.

III. REQUEST FOR EFFECTIVE DATE OF AUGUST 3, 2022

PJM requests that the enclosed revisions become effective on August 3, 2022, which is sixty days after the date of this filing.

IV. COMMUNICATIONS

PJM requests that all communications regarding this filing be directed to the following persons:

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V. ADDITIONAL INFORMATION

In accordance with section 35.13(a) (1) of the Commission's regulations, 18 C.F.R. § 35.13(a) (1), PJM provides the following information:

This filing consists of the following:

1. This transmittal letter;
2. Attachment A – Revisions to the PJM Tariff (marked);
3. Attachment B – Revisions to the PJM Tariff (clean);
4. Attachment C – Affidavit and Exhibits of Lisa M. Drauschak;
5. Attachment D – Affidavit of Dr. Alex Eydeland.

VI. 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,[131] PJM will post a copy of this filing to the FERC filings section of its internet site, located at the following link: https://www.pjm.com/library/filing-order.aspx with a specific link to the newly-filed document, and will send an email on the same date as this filing to all PJM Members and all state utility regulatory commissions in the PJM Region[132] alerting them that this filing has been made by PJM today, and is available by following such link.

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

[132] PJM already maintains, updates, and regularly uses email lists for all PJM Members and affected commissions.

VII. CONCLUSION

In accordance with the foregoing, PJM respectfully requests that the Commission accept the proposed revisions to the Tariff effective August 3, 2022, as discussed herein.

Respectfully submitted,

/s/ Paul M. Flynn

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On behalf of PJM Interconnection, L.L.C.

Attachment A

Revisions to the
PJM Open Access Transmission Tariff

(Marked/Redline Format)

ATTACHMENT Q

CREDIT RISK MANAGEMENT POLICY

I. INTRODUCTION

It is the policy of PJM that prior to an entity participating in any PJM Markets or in order to take Transmission Service, the entity must demonstrate its ability to meet the requirements in this Attachment Q. This Attachment Q also sets forth PJM's authority to deny, reject, or terminate a Participant's right to participate in any PJM Markets in order to protect the PJM Markets and PJM Members from unreasonable credit risk from any Participant's activities. Given the interconnectedness and overlapping of their responsibilities, PJM Interconnection, L.L.C. and PJM Settlement, Inc. are referred to both individually and collectively herein as "PJM."

PURPOSE

PJMSettlement is the counterparty to transactions in the PJM Markets. As a consequence, if a Participant defaults on its obligations under this Attachment Q, or PJM determines a Participant represents unreasonable credit risk to the PJM Markets, and the Participant does not post Collateral, additional Collateral or Restricted Collateral in response to a Collateral Call, the result is that the Participant represents unsecured credit risk to the PJM Markets. For this reason, PJM must have the authority to monitor and manage credit risk on an ongoing basis, and to act promptly to mitigate or reduce any unsecured credit risk, in order to protect the PJM Markets and PJM Members from losses.

This Attachment Q describes requirements for: (1) eligibility to be a Market Participant, (2) establishment and maintenance of credit by Market Participants, and (3) collateral requirements and forms of credit support that will be deemed as acceptable to mitigate risk to any PJM Markets.

This Attachment Q also sets forth (1) PJM's authority to monitor and manage credit risk that a Participant may represent to the PJM Markets and/or PJM membership in general, (2) the basis for establishing limits that will be imposed on a Market Participant in order to minimize risk, and (3) various obligations and requirements the violation of which will result in an Event of Default pursuant to this Attachment Q and the Agreements.

Attachment Q describes the types of data and information PJM will review in order to determine whether an Applicant or Market Participant presents an unreasonable risk to any PJM Markets and/or PJM membership in general, and the steps PJM may take in order to address that risk.

APPLICABILITY

This Attachment Q applies to all Applicants and Market Participants who take Transmission Service under this Tariff, or participate in any PJM Markets or market activities under the Agreements. Notwithstanding anything to the contrary in this Attachment Q, simply taking transmission service or procuring Ancillary Services via market-based rates does not imply market participation for purposes of applicability of this Attachment Q.

II. RISK EVALUATION PROCESS

PJM will conduct a risk evaluation to determine eligibility to become and/or remain a Market Participant or Guarantor that: (1) assesses the entity's financial strength, risk profile, creditworthiness, and other relevant factors; (2) determines an Unsecured Credit Allowance, if appropriate; (3) determines appropriate levels of Collateral; and (4) evaluates any Credit Support, including Guaranties or Letters of Credit.

A. Initial Risk Evaluation

PJM will perform an initial risk evaluation of each Applicant and/or its Guarantor. As part of the initial risk evaluation, PJM will consider certain Minimum Participation Requirements, assign an Internal Risk Score, establish an Unsecured Credit Allowance if appropriate, and make a determination regarding required levels of Collateral, creditworthiness, credit support, Restricted Collateral and other assurances for participation in certain PJM Markets.

Each Applicant and/or its Guarantor must provide the information set forth below at the time of its initial application pursuant to this Attachment Q and on an ongoing basis in order to remain eligible to participate in any PJM Markets. The same quantitative and qualitative factors will be used to evaluate Participants whether or not they have rated debt.

1. Rating Agency Reports

PJM will review Rating Agency reports from Standard & Poor's, Moody's Investors Service, Fitch Ratings, or other Nationally Recognized Statistical Rating Organization for each Applicant and/or Guarantor. The review will focus on the Applicant's or its Guarantor's senior unsecured debt ratings. If senior unsecured debt ratings are not available, PJM may consider other ratings, including issuer ratings, corporate ratings and/or an implied rating based on an internally derived Internal Credit Score pursuant to section II.A.3 below.

2. Financial Statements and Related Information

Each Applicant and/or its Guarantor must submit, or cause to be submitted, audited financial statements, except as otherwise indicated below, prepared in accordance with United States Generally Accepted Accounting Principles ("US GAAP") or any other format acceptable to PJM for the three (3) fiscal years most recently ended, or the period of existence of the Applicant and/or its Guarantor, if shorter. Applicants and/or their Guarantors must submit, or cause to be submitted, financial statements, which may be unaudited, for each completed fiscal quarter of the current fiscal year. All audited financial statements provided by the Applicant and/or its Guarantor must be audited by an Independent Auditor.

The information should include, but not be limited to, the following:

(a) If the Applicant and/or its Guarantor has publicly traded securities:

(i) Annual reports on Form 10-K, together with any amendments thereto;

(ii) Quarterly reports on Form 10-Q, together with any amendments thereto;

(iii) Form 8-K reports, if any, that have been filed since the most recent Form 10-K;

(iv) A summary provided by the Principal responsible, or to be responsible, for PJM Market activity of: (1) the Participant's primary purpose(s) of activity or anticipated activity in the PJM Markets (investment, trading or "hedging or mitigating commercial risks," as such phrase has meaning in the CFTC's regulations regarding the end-user exception to clearing); (2) the experience of the Participant (and its Principals) in managing risks in similar markets, including other organized RTO/ISO markets or on regulated commodity exchanges; and (3) a high level overview of the Participant's intended participation in the PJM Markets.

(v) All audited financial statements provided by an Applicant with publicly traded securities and/or its Guarantor with publicly traded securities must be audited by an Independent Auditor that satisfies the requirements set forth in the Sarbanes-Oxley Act of 2002.

(b) If the Applicant and/or its Guarantor does not have publicly-traded securities:

(i) Annual Audited Financial Statements or equivalent independently audited financials, and quarterly financial statements, generally found on:
- Balance Sheets
- Income Statements
- Statements of Cash Flows
- Statements of Stockholder's or Member's Equity or Net Worth;

(ii) Notes to Annual Audited Financial Statements, and notes to quarterly financial statements if any, including disclosures of any material changes from the last report;

(iii) Disclosure equivalent to a Management's Discussion & Analysis, including an executive overview of operating results and outlook, and compliance with debt covenants and indentures, and off balance sheet arrangements, if any;

(iv) Auditor's Report with an unqualified opinion or written letter from auditor containing the opinion whether the annual audited financial statements comply with the US GAAP or any other format acceptable to PJM; and

(v) A summary provided by the Principal responsible or to be responsible for PJM Market activity of: (1) the Participant's primary purpose(s) of activity or anticipated activity in the PJM Markets (investment, trading or "hedging or mitigating commercial risks," as such phrase has meaning in the CFTC's regulations regarding the end-user exception to clearing); (2) the experience of the Participant (and its Principals) in managing risks in similar markets, including other organized RTO/ISO markets or on regulated commodity exchanges; and (3) a high level overview of the Participant's intended participation in the PJM Markets.

(c) If Applicant and/or Guarantor is newly formed, does not yet have three (3) years of audited financials, or does not routinely prepare audited financial statements, PJM may specify other information to allow it to assess the entity's creditworthiness, including but not limited to:

(i) Equivalent financial information traditionally found in:
- Balance Sheets
- Income Statements
- Statements of Cash Flows

(ii) Disclosure equivalent to a Management's Discussion & Analysis, including an executive overview of operating results and outlook, and compliance with debt covenants and indentures, and off balance sheet arrangements, if any; and

(iii) A summary provided by the Principal responsible or to be responsible for PJM Market activity of: (1) the Participant's primary purpose(s) of activity or anticipated activity in the PJM Markets (investment, trading or "hedging or mitigating commercial risks," as such phrase has meaning in the CFTC's regulations regarding the end-user exception to clearing); (2) the experience of the Participant (and its Principals) in managing risks in similar markets, including other organized RTO/ISO markets or on regulated commodity exchanges; and (3) a high level overview of the Participant's intended participation in the PJM Markets.

(d) During a two year transition period from June 1, 2020 to May 31, 2022, the Applicant or Guarantor may provide a combination of audited financial statements and/or equivalent financial information.

If any of the above information in this section II.A.2 is available on the internet, the Applicant and/or its Guarantor may provide a letter stating where such statements can be located and retrieved by PJM. If an Applicant and/or its Guarantor files Form 10-K, Form 10-Q, or Form 8-K with the SEC, then the Applicant and/or its Guarantor will be deemed to have satisfied the requirement by indicating to PJM where the information in this section II.A.2 can be located on the internet.

If the Applicant and/or its Guarantor fails, for any reason, to provide the information required above in this section II.A.2, PJM has the right to (1) request Collateral and/or Restricted Collateral to cover the amount of risk reasonably associated with the Applicant and/or its Guarantor's expected activity in any PJM Markets, and/or (2) restrict the Applicant from participating in certain PJM Markets, including but not limited to restricting the positions the Applicant (once it becomes a Market Participant) takes in the market.

For certain Applicants and/or their Guarantors, some of the above submittals may not be applicable and alternate requirements for compliant submittals may be specified by PJM. In the credit evaluation of Municipalities and Cooperatives, PJM may also request additional information as part of the initial and ongoing review process and will consider other qualitative factors in determining financial strength and creditworthiness.

3. Credit Rating and Internal Credit Score

PJM will use credit risk scoring methodologies as a tool in determining an Unsecured Credit Allowance for each Applicant and/or its Guarantor. As its source for calculating the Unsecured Credit Allowance, PJM will rely on the ratings from a Rating Agency, if any, on the Applicant's or Guarantor's senior unsecured debt or their issuer ratings or corporate ratings if senior unsecured debt ratings are not available. If there is a split rating between the Rating Agencies, the lower of the ratings shall apply. If no external credit rating is available PJM will utilize its Internal Credit Score in order to calculate the Unsecured Credit Allowance.

The model used to develop the Internal Credit Score will be quantitative, based on financial data found in the income statement, balance sheet, and cash flow statement, and it will be qualitative based on relevant factors that may be internal or external to a particular Applicant and/or its Guarantor.

PJM will employ a framework, as outlined in Tables 1-5 below, based on metrics internal to the Applicant and/or its Guarantor, including capital and leverage, cash flow coverage of fixed obligations, liquidity, profitability, and other qualitative factors. The particular metrics and scoring rules differ according to the Applicant's or Guarantor's line of business and the PJM Markets in which it anticipates participating, in order to account for varying sources and degrees of risk to the PJM Markets and PJM members.

The formulation of each metric will be consistently applied to all Applicants and Guarantors across industries with slight variations based on identifiable differences in entity type, anticipated market activity, and risks to the PJM Markets and PJM members. In instances where the external credit rating is used to calculate the unsecured credit allowance, PJM may also use the Internal Credit Score as an input into determining the overall risk profile of an Applicant and/or its Guarantor.

Table 1. Quantitative Metrics by Line of Business: Leverage and Capital Structure	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
Debt / Total Capitalization (%)	primary metric	primary metric	primary metric	primary metric	secondary metric	secondary metric	primary metric		primary metric	primary metric
FFO / Debt (%)	secondary metric	secondary metric	primary metric	secondary metric	primary metric	primary metric	secondary metric		primary metric	
Debt / EBITDA (x)	secondary metric	secondary metric	secondary metric	secondary metric	primary metric	primary metric	secondary metric		primary metric	
Debt / Property, Plant & Equipment (%)	secondary metric	secondary metric	secondary metric	secondary metric						
Retained Earnings / Total Assets (%)	primary metric	primary metric		primary metric			primary metric			
Debt / Avg Daily Production or KwH ($)	secondary metric	secondary metric	secondary metric	secondary metric			primary metric			
Tangible Net Worth ($)						secondary metric		primary metric	secondary metric	secondary metric
Core Capital / Total Assets (%)								primary metric		
Risk-Based Capital / RWA (%)								primary metric		
Tier 1 Capital / RWA (%)								primary metric		
Equity / Investments (%)										primary metric
Debt / Investments (%)										primary metric

primary metric *secondary metric* *FFO = Funds From Operations RWA = Risk-Weighted Asserts*

Table 2. Quantitative Metrics by Line of Business: Fixed Charge Coverage and Funding	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
EBIT / Interest Expense (x)	primary metric	primary metric	primary metric	primary metric	primary metric	primary metric	primary metric		primary metric	primary metric
EBITDA / Interest Expense (x)	primary metric	primary metric	secondary metric	primary metric	primary metric	primary metric	primary metric			
EBITDA / [Interest Exp + CPLTD] (x)	secondary metric	secondary metric	primary metric	secondary metric	secondary metric	secondary metric	secondary metric			
[FFO + Interest Exp] / Interest Exp (x)	secondary metric	secondary metric	primary metric	secondary metric	secondary metric	secondary metric	secondary metric			
Loans / Total Deposits (%)								primary metric		
NPL / Gross Loans (%)								primary metric		
NPL / [Net Worth + LLR] (%)								primary metric		
Market Funding / Tangible Bank Assets (%)								primary metric		

primary metric *secondary metric* *CPLTD = Current Portion of Long-Term Debt EBIT = Earnings Before Interest and Taxes EBITDA = Earnings Before Interest, Taxes, Depreciation and Amortization LLR = Loan Loss Reserves NPL = Non-Performing Loans*

Table 3. Quantitative Metrics by Line of Business: Liquidity	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
CFFO / Total Debt (x)										
Current Assets / Current Liabilities (x)										
Liquid Assets / Tangible Bank Assets (%)										
Sources / Uses of Funds (x)										
Weighted Avg Maturity of Debt (yrs)										
Floating Rate Debt / Total Debt (%)										

primary metric *secondary metric* *CFFO = Cash Flow From Operations*

Table 4. Quantitative Metrics by Line of Business: Profitability	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
Return on Assets (%)										
Return on Equity (%)										
Profit Volatility (%)										
Return on Revenue (%)										
Net Income / Tangible Assets (%)										
Net Profit ($)										
Net Income / Dividends (x)										

primary metric *secondary metric*

Table 5. Qualitative Factors: Industry Level	**Sample Reference Metrics**	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
Need for PJM Markets to Achieve Business Goals	Rating Agency criteria or other industry analysis	High	High	High	High	Med	Low	Med	Low	Low	N/A
Ability to Grow/Enter Markets other than PJM	Rating Agency criteria or other industry analysis	Very Low	Very Low	Very Low	Very Low	High	High	Med	Med	High	N/A

Other Participants' Ability to Serve Customers	Rating Agency criteria or other industry analysis	Low	Low	Low	Low	Low	Med	Low	Low	High	N/A
Regulation of Participant's Business	RRA regulatory climate scores, S&P BICRA	PUCS	Govt	N/A	FERC PUCs	N/A	N/A	N/A	N/A	N/A	N/A
Primary Purpose of PJM Activity	Investment ("Inv.")/ Trading ("Trade")/ Hedging or Mitigating Commercial Risk of Operations ("CRH")	CRH	CRH	CRH	CRH/ Trade	CRH/ Trade	CRH/ Trade	CRH/ Trade	Inv./ Trade	Inv./ Trade	Inv./ Trade

RRA = Regulatory Research Associates, a division of S&P Global, Inc. *BICRA = Bank Industry Country Risk Assessment*

The scores developed will range from 1-6, with the following mappings:

1 = Very Low Risk (S&P/Fitch: AAA to AA-; Moody's: Aaa to Aa3)
2 = Low Risk (S&P/Fitch: A+ to BBB+; Moody's: A1 to Baa1)
3 = Low to Medium Risk (S&P/Fitch: BBB; Moody's: Baa2)
4 = Medium Risk (S&P/Fitch: BBB-; Moody's: Baa3)
5 = Medium to High Risk (S&P/Fitch: BB+ to BB; Moody's Ba1 to Ba2)
6 = High Risk (S&P/Fitch: BB- and below; Moody's: Ba3 and below)

4. Trade References

If deemed necessary by PJM, whether because the Applicant is newly or recently formed or for any other reason, each Applicant and/or its Guarantor shall provide at least one (1) bank reference and three (3) Trade References to provide PJM with evidence of Applicant's understanding of the markets in which the Applicant is seeking to participate and the Applicant's experience and ability to manage risk. PJM may contact the bank references and Trade References provided by the Applicant to verify their business experience with the Applicant.

5. Litigation and Contingencies

Unless prohibited by law, each Applicant and Guarantor is also required to disclose and provide information as to the occurrence of, within the five (5) years prior to the submission of the information to PJM (i) any litigation, arbitration, investigation (formal inquiry initiated by a governmental or regulatory entity), or proceeding, pending or, to the knowledge of the involving, Applicant or its Guarantor or any of their Principals that would likely have a material adverse impact on its financial condition and/or would likely materially affect the risk of non-payment by the Applicant or Guarantor, or (ii) any finding of material defalcation, market manipulation or fraud by or involving the Applicant, Guarantor, or any of their Principals, predecessors, subsidiaries, or Credit Affiliates that participate in any United States power markets based upon a final adjudication of regulatory and/or legal proceedings, (iii) any bankruptcy declarations or petitions by or against an Applicant and/or Guarantor, or (iv) any violation by any of the foregoing of any federal or state regulations or laws regarding energy commodities, U.S. Commodity Futures Trading Commission ("CFTC") or FERC requirements, the rules of any exchange monitored by the National Futures Association, any self-regulatory organization or any other governing, regulatory, or standards body responsible for regulating activity in North American markets for electricity, natural gas or electricity-related commodity products. Each Applicant and Guarantor shall take reasonable measures to obtain permission to disclose information related to a non-public investigation. These disclosures shall be made by Applicant and Guarantor upon application, and within ten (10) Business Days of any material change with respect to any of the above matters.

6. History of Defaults in Energy Projects

Each Applicant and Guarantor shall disclose their current default status and default history for any energy related generation or transmission project (e.g. generation, solar, development), and within any wholesale or retail energy market, including but not limited to within PJM, any Independent System Operator or Regional Transmission Organization, and exchange that has not been cured within the past five (5) years. Defaults of a non-recourse project financed entity may not be included in the default history.

7. Other Disclosures and Additional Information

Each Applicant and Guarantor is required to disclose any Credit Affiliates that are currently Members of PJM, applying for membership with PJM, Transmission Customers, Participants, applying to become Market Participants, or that participate directly or indirectly in any PJM Markets or any other North American markets for electricity, natural gas or electricity-related commodity products. Each Applicant and Guarantor shall also provide a copy of its limited liability company agreement or equivalent agreement, certification of formation, articles of incorporation or other similar organization document, offering memo or equivalent, the names of its five (5) most senior Principals, and information pertaining to any non-compliance with debt covenants and indentures.

Applicants shall provide PJM the credit application referenced in section III.A and any other information or documentation reasonably required for PJM to perform the initial risk evaluation of Applicant's or Guarantor's creditworthiness and ability to comply with the requirements contained in the Agreements related to settlements, billing, credit requirements, and other financial matters.

B. Supplemental Risk Evaluation Process

As described in section VI below, PJM will conduct a supplemental risk evaluation process for Applicants, Participants, and Guarantors applying to conduct virtual and export transactions or participate in any PJM Markets.

C. Unsecured Credit Allowance

A Market Participant may request that PJM consider it for an Unsecured Credit Allowance pursuant to the provisions herein. Notwithstanding the foregoing, an FTR Participant shall not be considered for an Unsecured Credit Allowance for participation in the FTR markets.

1. Unsecured Credit Allowance Evaluation

PJM will perform a credit evaluation on each Participant that has requested an Unsecured Credit Allowance, both initially and at least annually thereafter. PJM shall determine the amount of Unsecured Credit Allowance, if any, that can be provided to the Market Participant in accordance with the creditworthiness and other requirements set forth in this Attachment Q. In completing the credit evaluation, PJM will consider:

(a) Rating Agency Reports

PJM will review Rating Agency reports as for each Market Participant on the same basis as described in section II.A.1 above and section II.E.1 below.

(b) Financial Statements and Related Information

All financial statements and related information considered for an Unsecured Credit Allowance must satisfy all of the same requirements described in section II.A.2 above and section II.E.2 below.

2. Material Adverse Changes

Each Market Participant is responsible for informing PJM, in writing, of any Material Adverse Change in its financial condition (or the financial condition of its Guarantor) since the date of the Market Participant or Guarantor's most recent annual financial statements provided to PJM, pursuant to the requirements reflected in section II.A.2 above and section II.E.3 below.

In the event that PJM determines that a Material Adverse Change in the financial condition of a Market Participant warrants a requirement to provide Collateral, additional Collateral or Restricted Collateral, PJM shall comply with the process and requirements described in section II.A above and section II.E below.

3. Other Disclosures

Each Market Participant desiring an Unsecured Credit Allowance is required to make the disclosures and upon the same requirements reflected in section II.A.7 above and section II.E.7 below.

D. Determination of Unreasonable Credit Risk

Unreasonable credit risk shall be determined by the likelihood that an Applicant will default on a financial obligation arising from its participation in any PJM Markets. Indicators of potentially unreasonable credit risk include, but are not limited to, a history of market manipulation based upon a final adjudication of regulatory and/or legal proceedings, a history of financial defaults, a history of bankruptcy or insolvency within the past five (5) years, or a combination of current market and financial risk factors such as low capitalization, a reasonably likely future material financial liability, a low Internal Credit Score (derived pursuant to section II.A.3 above) and/or a low externally derived credit score. PJM's determination will be based on, but not limited to, information and material provided to PJM during its initial risk evaluation process, information and material provided to PJM in the Officer's Certification, and/or information gleaned by PJM from public and non-public sources.

If PJM determines that an Applicant poses an unreasonable credit risk to the PJM Markets, PJM may require Collateral, additional Collateral, or Restricted Collateral commensurate with the Applicant's risk of financial default, reject an application, and/or limit or deny Applicant's participation in the PJM Markets, to the extent and for the time period it determines is necessary to mitigate the unreasonable credit risk to the PJM Markets. PJM will reject an application if it determines that Collateral, additional Collateral, or Restricted Collateral cannot address the risk.

PJM will communicate its concerns regarding whether the Applicant presents an unreasonable credit risk, if any, in writing to the Applicant and attempt to better understand the circumstances surrounding that Applicant's financial and credit position before making its determination. In the event PJM determines that an Applicant presents an unreasonable credit risk that warrants a requirement to provide Collateral of any type, or some action to mitigate risk, PJM shall provide the Applicant with a written explanation of why such determination was made.

E. Ongoing Risk Evaluation

In addition to the initial risk evaluation set forth in sections II.A through II.D above and the annual certification requirements set forth in section III.A below, each Market Participant and/or its Guarantor has an ongoing obligation to provide PJM with the information required in section IV.A described in more detail below. PJM may also review public information regarding a Market Participant and/or its Guarantor as part of its ongoing risk evaluation. If appropriate, PJM will revise the Market Participant's Unsecured Credit Allowance and/or change its determination of creditworthiness, credit support, Restricted Collateral, required Collateral or other assurances pursuant to PJM's ongoing risk evaluation process.

Each Market Participant and/or its Guarantor must provide the information set forth below on an ongoing basis in order to remain eligible to participate in any PJM Markets. The same quantitative and qualitative factors will be used to evaluate Market Participants whether or not they have rated debt.

1. Rating Agency Reports

PJM will review Rating Agency reports for each Market Participant and/or Guarantor on the same basis as described in section II.A.1 above.

2. Financial Statements and Related Information

On an ongoing basis, Market Participants and/or their Guarantors shall provide the information they are required to provide as described in section II.A.2 above, pursuant to the schedule reflected below, with one exception. With regard to the summary that is required to be provided by the Principal responsible for PJM Market activity, with respect to experience of the Participant or its Principals in managing risks in similar markets, the Principal only needs to provide that information for a new Principal that was not serving in the position when the prior summary was provided. PJM will review financial statements and related information for each Market Participant and/or Guarantor on the same basis as described in section II.A.2 above.

Each Market Participant and/or its Guarantor must submit, or cause to be submitted, annual audited financial statements, except as otherwise indicated below, prepared in accordance with US GAAP or any other format acceptable to PJM for the fiscal year most recently ended within ten (10) calendar days of the financial statements becoming available and no later than one hundred twenty (120) calendar days after its fiscal year end. Market Participants and/or their Guarantors must submit, or cause to be submitted, financial statements, which may be unaudited, for each completed fiscal quarter of the current fiscal year, promptly upon their issuance, but no later than sixty (60) calendar days after the end of each fiscal quarter. All audited financial statements provided by the Market Participant and/or its Guarantor must be audited by an Independent Auditor.

Notwithstanding the foregoing, PJM may upon request, grant a Market Participant or Guarantor an extension of time, if the financials are not available within the time frame stated above.

3. Material Adverse Changes

Each Market Participant and each Guarantor is responsible for informing PJM, in writing, of any Material Adverse Change in its or its Guarantor's financial condition within five (5) Business Days of any Principal becoming aware of the occurrence of a Material Adverse Change since the date of the Market Participant or Guarantor's most recent annual financial statements provided to PJM. However, PJM may also independently establish from available information that a Participant and/or its Guarantor has experienced a Material Adverse Change in its financial condition without regard to whether such Market Participant or Guarantor has informed PJM of the same.

For the purposes of this Attachment Q, a Material Adverse Change in financial condition may include, but is not be limited to, any of the following:

(a) a bankruptcy filing;
(b) insolvency;
(c) a significant decrease in market capitalization;
(d) restatement of prior financial statements unless required due to regulatory changes;
(e) the resignation or removal of a Principal unless there is a new Principal appointed or expected to be appointed, a transition plan in place pending the appointment of a new Principal, or a planned restructuring of such roles;

(f) the filing of a lawsuit or initiation of an arbitration, investigation, or other proceeding that would likely have a material adverse effect on any current or future financial results or financial condition or increase the likelihood of non-payment;

(g) a material financial default in any other organized energy, ancillary service, financial transmission rights and/or capacity markets including but not limited to those of another Regional Transmission Organization or Independent System Operator, or on any commodity exchange, futures exchange or clearing house, that has not been cured or remedied after any required notice has been given and any cure period has elapsed;

(h) a revocation of a license or other authority by any Federal or State regulatory agency; where such license or authority is necessary or important to the Participant's continued business, for example, FERC market-based rate authority, or State license to serve retail load;

(i) a significant change in credit default swap spreads, market capitalization, or other market-based risk measurement criteria, such as a recent increase in Moody's KMV Expected Default Frequency (EDF^{tm}) that is materially greater than the increase in its peers' EDF^{tm} rates, or a collateral default swap (CDS) premium normally associated with an entity rated lower than investment grade;

(j) a confirmed, undisputed material financial default in a bilateral arrangement with another Participant or counterparty that has not been cured or remedied after any required notice has been given and any cure period has elapsed;

(k) the sale by a Participant of all or substantially all of its bilateral position(s) in the PJM Markets;

(l) any adverse changes in financial condition which, individually, or in the aggregate, are material; and,

(m) any adverse changes, events or occurrences which, individually or in the aggregate, could affect the ability of the entity to pay its debts as they become due or could reasonably be expected to have a material adverse effect on any current or future financial results or financial condition.

Upon identification of a Material Adverse Change, PJM shall evaluate the financial strength and risk profile of the Market Participant and/or its Guarantor at that time and may do so on a more frequent basis going forward. If the result of such evaluation identifies unreasonable credit risk to any PJM Market as further described in section II.E.8 below, PJM will take steps to mitigate the financial exposure to the PJM Markets. These steps include, but are not limited to requiring the Market Participant and/or each Guarantor to provide Collateral, additional Collateral or additional Restricted Collateral that is commensurate with the amount of risk in which the Market Participant wants to engage, and/or limiting the Market Participant's ability to participate in any PJM Market to the extent, and for the time-period necessary to mitigate the unreasonable credit risk. In the event PJM determines that a Material Adverse Change in the financial condition or risk profile of a Market Participant and/or Guarantor, warrants a requirement to provide Collateral of any type, or some action to mitigate risk, PJM shall provide the Market Participant and/or Guarantor, a written explanation of why such determination was made. Conversely, in the event PJM determines there has been an improvement in the financial condition or risk profile of a Market Participant and/or Guarantor such that the amount of

Collateral needed for that Market Participant and/or Guarantor can be reduced, PJM shall provide a written explanation why such determination was made, including the amount of the Collateral reduction and indicating when and how the reduction will be made.

4. Litigation and Contingencies

Each Market Participant and/or Guarantor is required to disclose and provide information regarding litigation and contingencies as outlined in section II.A.5 above.

5. History of Defaults in Energy Projects

Each Market Participant and/or Guarantor is required to disclose current default status and default history as outlined in section II.A.6 above.

6. Internal Credit Score

As part of its ongoing risk evaluation, PJM will use credit risk scoring methodologies as a tool in determining an Internal Credit Score for each Market Participant and/or Guarantor, utilizing the same model and framework outlined in section II.A.3 above.

7. Other Disclosures and Additional Information

Each Market Participant and/or Guarantor is required to make other disclosures and provide additional information outlined in section II.A.7 above.

PJM will monitor each Market Participant's use of services and associated financial obligations on a regular basis to determine their total potential financial exposure and for credit monitoring purposes, and may require the Market Participant and/or Guarantor to provide additional information, pursuant to the terms and provisions described herein.

Market Participants shall provide PJM, upon request, any information or documentation reasonably required for PJM to monitor and evaluate a Market Participant's creditworthiness and compliance with the Agreements related to settlements, billing, credit requirements, and other financial matters.

8. Unreasonable Credit Risk

If PJM has reasonable grounds to believe that a Market Participant and/or its Guarantor poses an unreasonable credit risk to any PJM Markets, PJM may immediately notify the Market Participant of such unreasonable credit risk and (1) issue a Collateral Call to demand Collateral, additional Collateral, or Restricted Collateral or other assurances commensurate with the Market Participant's and/or its Guarantor's risk of financial default or other risk posed by the Market Participant's or Guarantor's financial condition or risk profile to the PJM Markets and PJM members, or (2) limit or suspend the Market Participant's participation in any PJM Markets, to the extent and for such time period PJM determines is necessary to mitigate the unreasonable credit risk to any PJM Markets. PJM will only limit or suspend a Market Participant's market participation if Collateral, additional Collateral or Restricted Collateral cannot address the unreasonable credit risk.

PJM's determination will be based on, but not limited to, information and material provided to PJM during its ongoing risk evaluation process or in the Officer's Certification, and/or information gleaned by PJM from public and non-public sources. PJM will communicate its concerns, if any, in writing to the Market Participant and attempt to better understand the circumstances surrounding the Market Participant's financial and credit position before making its determination. At PJM's request or upon its own initiative, the Market Participant or its Guarantor may provide supplemental information to PJM that would allow PJM to consider reducing the additional Collateral requested or reducing the severity of limitations or other restrictions designed to mitigate the Market Participant's credit risk. Such information shall include, but not be limited to: (i) the Market Participant's estimated exposure, (ii) explanations for any recent change in the Market Participant's market activity, (iii) any relevant new load or unit outage information; or (iv) any default or supply contract expiration, termination or suspension.

The Market Participant shall have five (5) Business Days to respond to PJM's request for supplemental information. If the requested information is provided in full to PJM's satisfaction during said period, the additional Collateral requirement shall reflect the Market Participant's anticipated exposure based on the information provided. Notwithstanding the foregoing, any additional Collateral requested by PJM in a Collateral Call must be provided by the Market Participant within the applicable cure period.

In the event PJM determines that an Market Participant and/or its Guarantor presents an unreasonable credit risk, as described above, that warrants a requirement to provide Collateral of any type, or some action to mitigate risk, PJM shall provide the Market Participant with a written explanation of why such final determination was made.

PJM has the right at any time to modify any Unsecured Credit Allowance and/or require additional Collateral as may be deemed reasonably necessary to support current or anticipated market activity as set forth in Tariff, Attachment Q, sections II.A.2 and II.C.1.b. Failure to remit the required amount of additional Collateral within the applicable cure period shall constitute an Event of Default.

F. Collateral and Credit Restrictions

PJM may establish certain restrictions on available credit by requiring that some amounts of credit, i.e. Restricted Collateral, may not be available to satisfy credit requirements. Such designations shall be construed to be applicable to the calculation of credit requirements only, and shall not restrict PJM's ability to apply such designated credit to any obligation(s) in case of a default. Any such Restricted Collateral will be held by PJM, as applicable. Such Restricted Collateral will not be returned to the Participant until PJM has determined that the risk for which such Restricted Collateral is being held has subsided or been resolved.

PJM may post on PJM's web site, and may reference on OASIS, a supplementary document which contains additional business practices (such as algorithms for credit scoring) that are not included in this Attachment Q. Changes to the supplementary document will be subject to stakeholder review and comment prior to implementation. PJM may specify a required compliance date, not less than fifteen (15) calendar days from notification, by which time all Participants and their Guarantors must comply with provisions that have been revised in the supplementary document.

PJM will regularly post each Participant's and/or its Guarantor's credit requirements and credit provisions on the PJM web site in a secure, password-protected location. Each Participant and/or its Guarantor is responsible for monitoring such information, and maintaining sufficient credit to satisfy the credit requirements described herein. Failure to maintain credit sufficient to satisfy the credit requirements of the Attachment Q shall constitute a Credit Breach, and the Participant will be subject to the remedies established herein and in any of the Agreements.

G. Unsecured Credit Allowance Calculation

The external rating from a Rating Agency will be used as the source for calculating the Unsecured Credit Allowance, unless no external credit rating is available in which case PJM will utilize its Internal Credit Score for such purposes. If there is a split rating between the Rating Agencies, the lower of the ratings shall apply.

Where two or more entities, including Participants, are considered Credit Affiliates, Unsecured Credit Allowances will be established for each individual Participant, subject to an aggregate maximum amount for all Credit Affiliates as provided for in Attachment Q, section II.G.3.

In its credit evaluation of Municipalities and Cooperatives, PJM may request additional information as part of the ongoing risk evaluation process and will also consider qualitative factors in determining financial strength and creditworthiness.

1. Credit Rating and Internal Credit Score

As previously described in section II.A.3 above, PJM will determine the Internal Credit Score for an Applicant, Market Participant and/or its Guarantor using the credit risk scoring methodologies contained therein. Internal Credit Scores, ranging from 1-6, for each Applicant, Market Participant and/or its Guarantor, will be determined with the following mappings:

1 = Very Low Risk (S&P/Fitch: AAA to AA-; Moody's: Aaa to Aa3)
2 = Low Risk (S&P/Fitch: A+ to BBB+; Moody's: A1 to Baa1)
3 = Low to Medium Risk (S&P/Fitch: BBB; Moody's: Baa2)
4 = Medium Risk (S&P/Fitch: BBB-; Moody's: Baa3)
5 = Medium to High Risk (S&P/Fitch: BB+ to BB; Moody's Ba1 to Ba2)
6 = High Risk (S&P/Fitch: BB- and below; Moody's: Ba3 and below)

In instances where the external credit rating is used to calculate the unsecured credit allowance, PJM may also use the Internal Credit Score as an input into its determination of the overall risk profile of an Applicant and/or its Guarantor

2. Unsecured Credit Allowance

PJM will determine a Participant's Unsecured Credit Allowance based on its external rating or its Internal Credit Score, as applicable, and the parameters in the table below. The maximum Unsecured Credit Allowance is the lower of:

(a) A percentage of the Participant's Tangible Net Worth, as stated in the table below, with the percentage based on the Participant's external rating or Internal Credit Score, as applicable; and

(b) A dollar cap based on the external rating or Internal Credit Score, as applicable, as stated in the table below:

Internal Credit Score	**Risk Ranking**	**Tangible Net Worth Factor**	**Maximum Unsecured Credit Allowance ($ Million)**
1.00 – 1.99	1 – Very Low (AAA to AA-)	Up to 10.00%	$50
2.00 – 2.99	2 – Low (A+ to BBB+)	Up to 8.00%	$42
3.00 – 3.49	3 – Low to Medium (BBB)	Up to 6.00%	$33
3.50 – 4.49	4 – Medium (BBB-)	Up to 5.00%	$7
4.50 – 5.49	5 – Medium to High (BB+ to BB)	0%	$0
> 5.49	6 – High (BB- and below)	0%	$0

If a Corporate Guaranty is utilized to establish an Unsecured Credit Allowance for a Participant, the value of a Corporate Guaranty will be the lesser of:

(a) The limit imposed in the Corporate Guaranty;

(b) The Unsecured Credit Allowance calculated for the Guarantor; and

(c) A portion of the Unsecured Credit Allowance calculated for the Guarantor in the case of Credit Affiliates.

PJM has the right at any time to modify any Unsecured Credit Allowance and/or require additional Collateral as may be deemed reasonably necessary to support current market activity. Failure to remit the required amount of additional Collateral within the applicable cure period shall be deemed an Event of Default.

PJM will maintain a posting of each Participant's Unsecured Credit Allowance, along with certain other credit related parameters, on the PJM website in a secure, password-protected location. Each Participant will be responsible for monitoring such information and recognizing changes that may occur.

3. Unsecured Credit Limits For Credit Affiliates

If two or more Participants are Credit Affiliates and have requested an Unsecured Credit Allowance, PJM will consider the overall creditworthiness of the Credit Affiliates when determining the Unsecured Credit Allowances in order not to establish more Unsecured Credit for the Credit Affiliates collectively than the overall corporate family could support.

> **Example:** Participants A and B each have a $10.0 million Corporate Guaranty from their common parent, a holding company with an Unsecured Credit Allowance calculation of $12.0 million. PJM may limit the Unsecured Credit Allowance for each Participant to $6.0 million, so the total Unsecured Credit Allowance does not exceed the corporate family total of $12.0 million.

PJM will work with the Credit Affiliates to allocate the total Unsecured Credit Allowance among the Credit Affiliates while assuring that no individual Participant, nor common guarantor, exceeds the Unsecured Credit Allowance appropriate for its credit strength. The aggregate Unsecured Credit for a Participant, including Unsecured Credit Allowance granted based on its own creditworthiness and risk profile, and any Unsecured Credit Allowance conveyed through a Guaranty shall not exceed $50 million. The aggregate Unsecured Credit for a Credit Affiliate~~s~~ corporate family shall not exceed $50 million. A Credit Affiliate corporate family subject to this cap shall request PJM to allocate the maximum Unsecured Credit amongst the corporate family, assuring that no individual Participant or common guarantor, shall exceed the Unsecured Credit level appropriate for its credit strength and activity.

H. Contesting an Unsecured Credit Evaluation

PJM will provide to a Participant, upon request, a written explanation for any determination of or change in Unsecured Credit or credit requirement within ten (10) Business Days of receiving such request.

If a Participant believes that either its level of Unsecured Credit or its credit requirement has been incorrectly determined, according to this Attachment Q, then the Participant may send a request for reconsideration in writing to PJM. Such a request should include:

(1) A citation to the applicable section(s) of this Attachment Q along with an explanation of how the respective provisions of this Attachment Q were not carried out in the determination as made; and

(2) A calculation of what the Participant believes should be the appropriate Unsecured Credit or Collateral requirement, according to terms of this Attachment Q.

PJM will provide a written response as promptly as practical, but no more than ten (10) Business Days after receipt of the request. If the Participant still feels that the determination is incorrect, then the Participant may contest that determination. Such contest should be in written form, addressed to PJM, and should contain:

(1) A complete copy of the Participant's earlier request for reconsideration, including citations and calculations;

(2) A copy of PJM's written response to its request for reconsideration; and

(3) An explanation of why it believes that the determination still does not comply with this Attachment Q.

PJM will investigate and will respond to the Participant with a final determination on the matter as promptly as practical, but no more than twenty (20) Business Days after receipt of the request.

Neither requesting reconsideration nor contesting the determination following such request shall relieve or delay Participant's responsibility to comply with all provisions of this Attachment Q, including without limitation posting Collateral, additional Collateral or Restricted Collateral in response to a Collateral Call.

If a Corporate Guaranty is being utilized to establish credit for a Participant, the Guarantor will be evaluated and the Unsecured Credit Allowance granted, if any, based on the financial strength and creditworthiness, and risk profile of the Guarantor. Any utilization of a Corporate Guaranty will only be applicable to non-FTR credit requirements, and will not be applicable to cover FTR credit requirements.

PJM will identify any necessary Collateral requirements and establish a Working Credit Limit for each Participant. Any Unsecured Credit Allowance will only be applicable to non-FTR credit requirements, for positions in PJM Markets other than the FTR market, because all FTR credit requirements must be satisfied by posting Collateral.

III. MINIMUM PARTICIPATION REQUIREMENTS

A Participant seeking to participate in any PJM Markets shall submit to PJM any information or documentation reasonably required for PJM to evaluate its experience and resources. If PJM determines, based on its review of the relevant information and after consultation with the Participant, that the Participant's participation in any PJM Markets presents an unreasonable credit risk, PJM may reject the Participant's application to become a Market Participant, notwithstanding applicant's ability to meet other minimum participation criteria, registration requirements and creditworthiness requirements.

A. Annual Certification

Before they are eligible to transact in any PJM Market, all Applicants shall provide to PJM (i) an executed copy of a credit application and (ii) a copy of the annual certification set forth in Attachment Q, Appendix 1. As a condition to continued eligibility to transact in any PJM Market, Market Participants shall provide to PJM the annual certification set forth in Attachment Q, Appendix 1.

After the initial submission, the annual certification must be submitted each calendar year by all Market Participants between January 1 and April 30. PJM will accept such certifications as a matter of course and the Market Participants will not need further notice from PJM before commencing or maintaining their eligibility to participate in any PJM Markets.

A Market Participant that fails to provide its annual certification by April 30 shall be ineligible to transact in any PJM Markets and PJM will disable the Market Participant's access to any PJM Markets until such time as PJM receives the certification. In addition, failure to provide an executed annual certification in a form acceptable to PJM and by the specified deadlines may result in a default under the Tariff.

Market Participants acknowledge and understand that the annual certification constitutes a representation upon which PJM will rely. Such representation is additionally made under the Tariff, filed with and accepted by FERC, and any false, misleading or incomplete statement knowingly made by the Market Participant and that is material to the Market Participant's ability to perform may be considered a violation of the Tariff and subject the Market Participant to action by FERC. Failure to comply with any of the criteria or requirements listed herein or in the certification may result in suspension or limitation of a Market Participant's transaction rights in any PJM Markets.

Applicants and Market Participants shall submit to PJM, upon request, any information or documentation reasonably and/or legally required to confirm Applicant's or Market Participant's compliance with the Agreements and the annual certification.

B. PJM Market Participation Eligibility Requirements

PJM may conduct periodic verification to confirm that Applicants and Market Participants can demonstrate that they meet the definition of "appropriate person" to further ensure minimum criteria are in place. Such demonstration will consist of the submission of evidence and an executed Annual Officer Certification form as set forth in Attachment Q, Appendix 1 in a form acceptable to PJM. If an Applicant or Market Participant does not provide sufficient evidence for verification to PJM within five (5) Business Days of written request, then such Applicant or Market Participant may result in a default under this Tariff. Demonstration of "appropriate person" status and support of other certifications on the annual certification is one part of the Minimum Participation Requirements for any PJM Markets and does not obviate the need to meet the other Minimum Participation Requirements such as those for minimum capitalization and risk profile as set forth in this Attachment Q.

To be eligible to transact in any PJM Markets, an Applicant or Participant must demonstrate in accordance with the Risk Management and Verification processes set forth below that it qualifies in one of the following ways:

1. an "appropriate person," as that term is defined under Commodity Exchange Act, section 4(c)(3), or successor provision, or;

2. an "eligible contract participant," as that term is defined in Commodity Exchange Act, section 1a(18), or successor provision, or;

3. a business entity or person who is in the business of: (1) generating, transmitting, or distributing electric energy, or (2) providing electric energy services that are necessary to support the reliable operation of the transmission system, or;

4. an Applicant or Market Participant seeking eligibility as an "appropriate person" providing an unlimited Corporate Guaranty in a form acceptable to PJM as described in section V below from a Guarantor that has demonstrated it is an "appropriate person," and has at least $1 million of total net worth or $5 million of total assets per Applicant and Market Participant for which the Guarantor has issued an unlimited Corporate Guaranty, or;

5. an Applicant or Market Participant providing a Letter of Credit of at least $5 million to PJM in a form acceptable to PJM as described in section V below, that the Applicant or Market Participant acknowledges is separate from, and cannot be applied to meet, its credit requirements to PJM, or;

6. an Applicant or Market Participant providing a surety bond of at least $5 million to PJM in a form acceptable to PJM as described in section V below, that the Applicant or Market Participant acknowledges is separate from, and cannot be applied to meet, its credit requirements to PJM.

If, at any time, a Market Participant cannot meet the eligibility requirements set forth above, it shall immediately notify PJM and immediately cease conducting transactions in any PJM Markets. PJM may terminate a Market Participant's transaction rights in any PJM Markets if, at any time, it becomes aware that the Market Participant does not meet the minimum eligibility requirements set forth above.

In the event that a Market Participant is no longer able to demonstrate it meets the minimum eligibility requirements set forth above, and possesses, obtains or has rights to possess or obtain, any open or forward positions in any PJM Markets, PJM may take any such action it deems necessary with respect to such open or forward positions, including, but not limited to, liquidation, transfer, assignment or sale; provided, however, that the Market Participant will, notwithstanding its ineligibility to participate in any PJM Markets, be entitled to any positive market value of those positions, net of any obligations due and owing to PJM.

C. Risk Management and Verification

All Market Participants must maintain current written risk management policies, procedures, or controls to address how market and credit risk is managed, and are required to submit to PJM (at the time they make their annual certification) a copy of their current governing risk control policies, procedures and controls applicable to their market activities. PJM will review such documentation to verify that it appears generally to conform to prudent risk management practices for entities participating in any PJM Markets.

All Market Participants subject to this provision shall make a one-time payment of $1,500.00 to PJM to cover administrative costs. Thereafter, if such Participant's risk policies, procedures and controls applicable to its market activities change substantively, it shall submit such modified documentation, with applicable administrative charge determined by PJM, to PJM for review and verification at the time it makes its annual certification. All Market Participant's continued eligibility to participate in any PJM Markets is conditioned on PJM notifying a Participant that its annual certification, including the submission of its risk policies, procedures and controls, has been accepted by PJM. PJM may retain outside expertise to perform the review and verification function described in this section, however, in all circumstances, PJM and any third-party it may retain will treat as confidential the documentation provided by a Participant under this section, consistent with the applicable provisions of the Operating Agreement.

Participants must demonstrate that they have implemented prudent risk management policies and procedures in order to be eligible to participate in any PJM Markets. Participants must demonstrate on at least an annual basis that they have implemented and maintained prudent risk management policies and procedures in order to continue to participate in any PJM Markets. Upon written request, the Participant will have fourteen (14) calendar days to provide to PJM current governing risk management policies, procedures, or controls applicable to Participant's activities in any PJM Markets.

D. Capitalization

In advance of certification, Applicants shall meet the minimum capitalization requirements below. In addition to the annual certification requirements in Attachment Q, Appendix 1, a Market Participant shall satisfy the minimum capitalization requirements on an annual basis thereafter. A Participant must demonstrate that it meets the minimum financial requirements appropriate for the PJM Markets in which it transacts by satisfying either the minimum capitalization or the provision of Collateral requirements listed below:

1. Minimum Capitalization

Minimum capitalization may be met by demonstrating minimum levels of Tangible Net Worth or tangible assets. FTR Participants must demonstrate a Tangible Net Worth in excess of $1 million or tangible assets in excess of $10 million. Other Market Participants must demonstrate a Tangible Net Worth in excess of $500,000 or tangible assets in excess of $5 million.

(a) Consideration of tangible assets and Tangible Net Worth shall exclude assets which PJM reasonably believes to be restricted, highly risky, or potentially unavailable to settle a claim in the event of default. Examples include, but are not limited to, restricted assets, derivative assets, goodwill, and other intangible assets.

(b) Demonstration of "tangible" assets and Tangible Net Worth may be satisfied through presentation of an acceptable Corporate Guaranty, provided that both:

(i) the Guarantor is a Credit Affiliate company that satisfies the Tangible Net Worth or tangible assets requirements herein, and;

(ii) the Corporate Guaranty is either unlimited or at least $500,000.

If the Corporate Guaranty presented by the Participant to satisfy these capitalization requirements is limited in value, then the Participant's resulting Unsecured Credit Allowance shall be the lesser of:

(1) the applicable Unsecured Credit Allowance available to the Participant by the Corporate Guaranty pursuant to the creditworthiness provisions of this Attachment Q, or,

(2) the face value of the Corporate Guaranty, reduced by $500,000 and further reduced by 10%. (For example, a $10.5 million Corporate Guaranty would be reduced first by $500,000 to $10 million and then further reduced 10% more to $9 million. The resulting $9 million would be the Participant's Unsecured Credit Allowance available through the Corporate Guaranty).

In the event that a Participant provides Collateral in addition to a limited Corporate Guaranty to increase its available credit, the value of such Collateral shall be reduced by 10%. This reduced value shall be considered the amount available to satisfy requirements of this Attachment Q.

(c) Demonstrations of minimum capitalization (minimum Tangible Net Worth or tangible assets) must be presented in the form of audited financial statements for the Participant's most recent fiscal year during the initial risk evaluation process and ongoing risk evaluation process.

2. Provision of Collateral

If a Participant does not demonstrate compliance with its applicable minimum capitalization requirements above, it may still qualify to participate in any PJM Markets by posting Collateral, additional Collateral, and/or Restricted Collateral, subject to the terms and conditions set forth herein.

Any Collateral provided by a Participant unable to satisfy the minimum capitalization requirements above will also be restricted in the following manner:

(a) Collateral provided by Market Participants that engage in FTR transactions shall be reduced by an amount of the current risk plus any future risk to any PJM Markets and PJM membership in general, and may coincide with limitations on market participation. The amount of this Restricted Collateral shall not be available to cover any credit requirements from market activity. The remaining value shall be considered the amount available to satisfy requirements of this Attachment Q.

(b) Collateral provided by other Participants that engage in Virtual Transactions or Export Transactions shall be reduced by $200,000 and then further reduced by 10%. The amount of this Restricted Collateral shall not be available to cover any credit requirements from market activity. The remaining value shall be considered the amount available to satisfy requirements of this Attachment Q.

(c) Collateral provided by other Participants that do not engage in Virtual Transactions or Export Transactions shall be reduced by 10%. The amount of this Restricted Collateral shall not be available to cover any credit requirements from market activity. The remaining value shall be considered the amount available to satisfy requirements of this Attachment Q.

In the event a Participant that satisfies the minimum capital requirement through provision of Collateral also provides a Corporate Guaranty to increase its available credit, then the Participant's resulting Unsecured Credit Allowance conveyed through such Corporate Guaranty shall be the lesser of:

(a) the applicable Unsecured Credit Allowance available to the Participant by the Corporate Guaranty pursuant to the creditworthiness provisions of this Attachment Q; or

(b) the face value of the Corporate Guaranty, reduced commensurate with the amount of the current risk plus any anticipated future risk to any PJM Markets and PJM membership in general, and may coincide with limitations on market participation.

IV. ONGOING COVENANTS

A. Ongoing Obligation to Provide Information to PJM

So long as a Participant is eligible to participate, or participates or holds positions, in any PJM Markets, it shall deliver to PJM, in form and detail satisfactory to PJM:

(1) All financial statements and other financial disclosures as required by section II.E.2 by the deadline set forth therein;

(2) Notice, within five (5) Business Days, of any Principal becoming aware that the Participant does not meet the Minimum Participation Requirements set forth in section III;

(3) Notice when any Principal becomes aware of any matter that has resulted or would reasonably be expected to result in a Material Adverse Change in the financial condition of the Participant or its Guarantor, if any, a description of such Material Adverse Change in detail reasonable to allow PJM to determine its potential effect on, or any change in, the Participant's risk profile as a participant in any PJM Markets, by the deadline set forth in section II.E.3 above;

(4) Notice, within the deadline set forth therein, of any Principal becoming aware of a litigation or contingency event described in section II.E.4, or of a Material Adverse Change in any such litigation or contingency event previously disclosed to PJM, information in detail reasonable to allow PJM to determine its potential effect on, or any change in, the Market Participant's risk profile as a participant in any PJM Markets by the deadline set forth therein;

(5) Notice, within two (2) Business Days after any Principal becomes aware of a Credit Breach, Financial Default, or Credit Support Default, that includes a description of such default or event and the Participant's proposals for addressing the default or event;

(6) As soon as available but not later than April 30th of any calendar year, the annual Certification described in section III.A in a form set forth in Attachment Q, Appendix 1;

(7) Concurrently with submission of the annual certification, demonstration that the Participant meets the minimum capitalization requirements set forth in section III.D;

(8) Concurrently with submission of the annual certification and within the applicable deadline of any substantive change, or within the applicable deadline of a request from PJM, a copy of the Participant's written risk management policies, procedures or controls addressing how the Participant manages market and credit risk in the PJM Markets in which it participates, as well as a high level summary by the chief risk officer or other Principal regarding any material violations, breaches, or compliance or disciplinary actions related to the risk management policies, by the Participant under the policies, procedures or controls within the prior 12 months, as set forth in section IV.B below;

(9) Within five (5) Business Days of request by PJM, evidence demonstrating the Participant meets the definition of "appropriate person" or "eligible contract participant," as those terms are defined in the Commodity Exchange Act and the CFTC regulations promulgated thereunder, or of any other certification in the annual Certification; or

(10) Within a reasonable time after PJM requests, any other information or documentation reasonably and/or legally required by PJM to confirm Participant's compliance with the Tariff and its eligibility to participate in any PJM Markets.

Participants acknowledge and understand that the deliveries constitute representations upon which PJM will rely in allowing the Participant to continue to participate in its markets, with the Internal Credit Score and Unsecured Credit Allowance, if any, previously determined by PJM.

B. Risk Management Review

PJM shall also conduct a periodic compliance verification process to review and verify, as applicable, Participants' risk management policies, practices, and procedures pertaining to the Participant's activities in any PJM Markets. PJM shall review such documentation to verify that it appears generally to conform to prudent risk management practices for entities trading in any PJM Markets. Participant shall also provide a high level summary by the chief risk officer or other Principal regarding any material violations, breaches, or compliance or disciplinary actions in connection with such risk management policies, practices and procedures within the prior twelve (12) months.

If a third-party industry association publishes or modifies principles or best practices relating to risk management in North American markets for electricity, natural gas or electricity-related commodity products, PJM may, following stakeholder discussion and with no less than six (6) months prior notice to stakeholders, consider such principles or best practices in evaluating the Participant's risk controls.

PJM will prioritize the verification of risk management policies based on a number of criteria, including but not limited to how long the entity has been in business, the Participant's and its Principals' history of participation in any PJM Markets, and any other information obtained in determining the risk profile of the Participant.

Each Participant's continued eligibility to participate in any PJM Markets is conditioned upon PJM notifying the Participant of successful completion of PJM's verification of the Participant's risk management policies, practices and procedures, as discussed herein. However, if PJM notifies the Participant in writing that it could not successfully complete the verification process, PJM shall allow such Participant fourteen (14) calendar days to provide sufficient evidence for verification prior to declaring the Participant as ineligible to continue to participate in any PJM Markets, which declaration shall be in writing with an explanation of why PJM could not complete the verification. If the Participant does not provide sufficient evidence for verification to PJM within the required cure period, such Participant will be considered in default under this Tariff. PJM may retain outside expertise to perform the review and verification function described in this paragraph. PJM and any third party it may retain will treat as confidential the documentation provided by a Participant under this paragraph, consistent with the applicable provisions of the Agreements. If PJM retains such outside expertise, a Participant may direct in writing that PJM perform the risk management review and verification for such Participant instead of utilizing a third party, provided however, that employees and contract employees of PJM and PJM shall not be considered to be such outside expertise or third parties.

Participants are solely responsible for the positions they take and the obligations they assume in any PJM Markets. PJM hereby disclaims any and all responsibility to any Participant or PJM

Member associated with Participant's submitting or failure to submit its annual certification or PJM's review and verification of a Participant's risk policies, procedures and controls. Such review and verification is limited to demonstrating basic compliance by a Participant showing the existence of written policies, procedures and controls to limit its risk in any PJM Markets and does not constitute an endorsement of the efficacy of such policies, procedures or controls.

V. FORMS OF CREDIT SUPPORT

In order to satisfy their PJM credit requirements Participants may provide credit support in a PJM-approved form and amount pursuant to the guidelines herein, provided that, notwithstanding anything to the contrary in this section, a Market Participant in PJM's FTR markets shall meet its credit support requirements related to those FTR markets with either cash or Letters of Credit.

Unless otherwise restricted by PJM, credit support provided may be used by PJM to secure the payment of Participant's financial obligations under the Agreements.

Collateral which may no longer be required to be maintained under provisions of the Agreements, shall be returned at the request of a Participant, no later than two (2) Business Days following determination by PJM within a commercially reasonable period of time that such Collateral is not required.

Except when an Event of Default has occurred, a Participant may substitute an approved PJM form of Collateral for another PJM approved form of Collateral of equal value.

A. Cash Deposit

Cash provided by a Participant as Collateral will be held in a depository account by PJM. Interest shall accrue to the benefit of the Participant, provided that PJM may require Participants to provide appropriate tax and other information in order to accrue such interest credits.

PJM may establish an array of investment options among which a Participant may choose to invest its cash deposited as Collateral. The depository account shall be held in PJM's name in a banking or financial institution acceptable to PJM. Where practicable, PJM may establish a means for the Participant to communicate directly with the bank or financial institution to permit the Participant to direct certain activity in the PJM account in which its Collateral is held. PJM will establish and publish procedural rules, identifying the investment options and respective discounts in Collateral value that will be taken to reflect any liquidation, market and/or credit risk presented by such investments.

Cash Collateral may not be pledged or in any way encumbered or restricted from full and timely use by PJM in accordance with terms of the Agreements.

PJM has the right to liquidate all or a portion of the Collateral account balance at its discretion to satisfy a Participant's Total Net Obligation to PJM in the Event of Default under this Attachment Q or one or more of the Agreements.

B. Letter of Credit

An unconditional, irrevocable standby Letter of Credit can be utilized to meet the Collateral requirement. As stated below, the form, substance, and provider of the Letter of Credit must all be acceptable to PJM.

(1) The Letter of Credit will only be accepted from U.S.-based financial institutions or U.S. branches of foreign financial institutions ("financial institutions") that have a minimum corporate debt rating of "A" by Standard & Poor's or Fitch Ratings, or "A2" from Moody's Investors Service, or an equivalent short term rating from one of these agencies. PJM will consider the lowest applicable rating to be the rating of the financial institution. If the rating of a financial institution providing a Letter of Credit is lowered below A/A2 by any Rating Agency, then PJM may require the Participant to provide a Letter of Credit from another financial institution that is rated A/A2 or better, or to provide a cash deposit. If a Letter of Credit is provided from a U.S. branch of a foreign institution, the U.S. branch must itself comply with the terms of this Attachment Q, including having its own acceptable credit rating.

(2) The Letter of Credit shall state that it shall renew automatically for successive one-year periods, until terminated upon at least ninety (90) calendar days prior written notice from the issuing financial institution. If PJM or PJM receives notice from the issuing financial institution that the current Letter of Credit is being cancelled or expiring, the Participant will be required to provide evidence, acceptable to PJM, that such Letter of Credit will be replaced with appropriate Collateral, effective as of the cancellation date of the Letter of Credit, no later than thirty (30) calendar days before the cancellation date of the Letter of Credit, and no later than ninety (90) calendar days after the notice of cancellation. Failure to do so will constitute a default under this Attachment Q and one or more of the Agreements.

(3) PJM will post on its web site an acceptable standard form of a Letter of Credit that should be utilized by a Participant choosing to submit a Letter of Credit to establish credit at PJM. If the Letter of Credit varies in any way from the standard format, it must first be reviewed and approved by PJM. All costs associated with obtaining and maintaining a Letter of Credit and meeting the Attachment Q provisions are the responsibility of the Participant.

(4) PJM may accept a Letter of Credit from a financial institution that does not meet the credit standards of this Attachment Q provided that the Letter of Credit has third-party support, in a form acceptable to PJM, from a financial institution that does meet the credit standards of this Attachment Q.

C. Corporate Guaranty

An irrevocable and unconditional Corporate Guaranty may be utilized to establish an Unsecured Credit Allowance for a Participant. Such credit will be considered a transfer of Unsecured Credit from the Guarantor to the Participant, and will not be considered a form of Collateral.

PJM will post on its web site an acceptable form that should be utilized by a Participant choosing to establish its credit with a Corporate Guaranty. If the Corporate Guaranty varies in any way from the PJM format, it must first be reviewed and approved by PJM before it may be applied to satisfy the Participant's credit requirements.

The Corporate Guaranty must be signed by an officer of the Guarantor, and must demonstrate that it is duly authorized in a manner acceptable to PJM. Such demonstration may include either a corporate seal on the Corporate Guaranty itself, or an accompanying executed and sealed secretary's certificate from the Guarantor's corporate secretary noting that the Guarantor was duly authorized to provide such Corporate Guaranty and that the person signing the Corporate Guaranty is duly authorized, or other manner acceptable to PJM.

PJM will evaluate the creditworthiness of a Guarantor and will establish any Unsecured Credit granted through a Corporate Guaranty using the methodology and requirements established for Participants requesting an Unsecured Credit Allowance as described herein. Foreign Guaranties and Canadian Guaranties shall be subject to additional requirements as established herein.

If PJM determines at any time that a Material Adverse Change in the financial condition of the Guarantor has occurred, or if the Corporate Guaranty comes within thirty (30) calendar days of expiring without renewal, PJM may reduce or eliminate any Unsecured Credit afforded to the Participant through the guaranty. Such reduction or elimination may require the Participant to provide Collateral within the applicable cure period. If the Participant fails to provide the required Collateral, the Participant shall be in default under this Attachment Q.

All costs associated with obtaining and maintaining a Corporate Guaranty and meeting the Attachment Q provisions are the responsibility of the Participant.

1. Foreign Guaranties

A Foreign Guaranty is a Corporate Guaranty that is provided by a Credit Affiliate entity that is domiciled in a country other than the United States or Canada. The entity providing a Foreign Guaranty on behalf of a Participant is a Foreign Guarantor. A Participant may provide a Foreign Guaranty in satisfaction of part of its credit obligations or voluntary credit provision at PJM provided that all of the following conditions are met:

PJM reserves the right to deny, reject, or terminate acceptance of any Foreign Guaranty at any time, including for material adverse circumstances or occurrences.

(a) A Foreign Guaranty:
  - (i) Must contain provisions equivalent to those contained in PJM's standard form of Foreign Guaranty with any modifications subject to review and approval by PJM counsel.
  - (ii) Must be denominated in US currency.
  - (iii) Must be written and executed solely in English, including any duplicate originals.
  - (iv) Will not be accepted towards a Participant's Unsecured Credit Allowance for more than the following limits, depending on the Foreign Guarantor's credit rating:

Rating of Foreign Guarantor	Maximum Accepted Guaranty if Country Rating is AAA	Maximum Accepted Guaranty if Country Rating is AA+
A- and above	USD50,000,000	USD30,000,000
BBB+	USD30,000,000	USD20,000,000
BBB	USD10,000,000	USD10,000,000
BBB- or below	USD 0	USD 0

(v) May not exceed 50% of the Participant's total credit, if the Foreign Grantor is rated less than BBB+.

(b) A Foreign Guarantor:

(i) Must satisfy all provisions of this Attachment Q applicable to domestic Guarantors.

(ii) Must be a Credit Affiliate of the Participant.

(iii) Must maintain an agent for acceptance of service of process in the United States; such agent shall be situated in the Commonwealth of Pennsylvania, absent legal constraint.

(iv) Must be rated by at least one Rating Agency acceptable to PJM; the credit strength of a Foreign Guarantor may not be determined based on an evaluation of its audited financial statements without an actual credit rating as well.

(v) Must have a senior unsecured (or equivalent, in PJM's sole discretion) rating of BBB (one notch above BBB-) or greater by any and all agencies that provide rating coverage of the entity.

(vi) Must provide audited financial statements, in US GAAP format or any other format acceptable to PJM, with clear representation of net worth, intangible assets, and any other information PJM may require in order to determine the entity's Unsecured Credit Allowance.

(vii) Must provide a Secretary's Certificate from the Participant's corporate secretary certifying the adoption of Corporate Resolutions:

1. Authorizing and approving the Guaranty; and
2. Authorizing the Officers to execute and deliver the Guaranty on behalf of the Guarantor.

(viii) Must be domiciled in a country with a minimum long-term sovereign (or equivalent) rating of AA+/Aa1, with the following conditions:

1. Sovereign ratings must be available from at least two rating agencies acceptable to PJM (e.g. S&P, Moody's, Fitch, DBRS).
2. Each agency's sovereign rating for the domicile will be considered to be the lowest of: country ceiling, senior unsecured government debt, long-term foreign currency sovereign rating, long-term local currency sovereign rating, or other equivalent measures, at PJM's sole discretion.
3. Whether ratings are available from two or three agencies, the lowest of the two or three will be used.

(ix) Must be domiciled in a country that recognizes and enforces judgments of US courts.

(x) Must demonstrate financial commitment to activity in the United States as evidenced by one of the following:

1. American Depository Receipts (ADR) are traded on the New York Stock Exchange, American Stock Exchange, or NASDAQ.
2. Equity ownership worth over USD 100,000,000 in the wholly-owned or majority owned subsidiaries in the United States.

(xi) Must satisfy all other applicable provisions of the PJM Tariff and/or Operating Agreement, including this Attachment Q.

(xii) Must pay for all expenses incurred by PJM related to reviewing and accepting a foreign guaranty beyond nominal in-house credit and legal review.

(xiii) Must, at its own cost, provide PJM with independent legal opinion from an attorney/solicitor of PJM's choosing and licensed to practice law in the United States and/or Guarantor's domicile, in form and substance acceptable to PJM in its sole discretion, confirming the enforceability of the Foreign Guaranty, the Guarantor's legal authorization to grant the Guaranty, the conformance of the Guaranty, Guarantor, and Guarantor's domicile to all of these requirements, and such other matters as PJM may require in its sole discretion.

2. Canadian Guaranties

The entity providing a Canadian Guaranty on behalf of a Participant is a Canadian Guarantor. A Participant may provide a Canadian Guaranty in satisfaction of part of its credit obligations or voluntary credit provision at PJM provided that all of the following conditions are met.

PJM reserves the right to deny, reject, or terminate acceptance of any Canadian Guaranty at any time for reasonable cause, including material adverse circumstances or occurrences.

(a) A Canadian Guaranty:

(i) Must contain provisions equivalent to those contained in PJM's standard form of Foreign Guaranty with any modifications subject to review and approval by PJM counsel.

(ii) Must be denominated in US currency.

(iii) Must be written and executed solely in English, including any duplicate originals.

(b) A Canadian Guarantor:

(i) Must be a Credit Affiliate of the Participant.

(ii) Must satisfy all provisions of this Attachment Q applicable to domestic Guarantors.

(iii) Must maintain an agent for acceptance of service of process in the United States; such agent shall be situated in the Commonwealth of Pennsylvania, absent legal constraint.

(iv) Must be rated by at least one Rating Agency acceptable to PJM; the credit strength of a Canadian Guarantor may not be determined based on an evaluation of its audited financial statements without an actual credit rating as well.

(v) Must provide audited financial statements, in US GAAP format or any other format acceptable to PJM with clear representation of net worth, intangible assets, and any other information PJM may require in order to determine the entity's Unsecured Credit Allowance.

(vi) Must satisfy all other applicable provisions of the PJM Tariff and/or Operating Agreement, including this Attachment Q.

D. Surety Bond

An unconditional, irrevocable surety bond can be utilized to meet the Collateral requirement for Participants. As stated below, the form, substance, and provider of the surety bond must all be acceptable to PJM.

(i) An acceptable surety bond must be payable immediately upon demand without prior demonstration of the validity of the demand. The surety bond will only be accepted from a U.S. Treasury-listed approved surety that has either (i) a minimum corporate debt rating of "A" by Standard & Poor's or Fitch Ratings, or "A2" from Moody's Investors Service, or an equivalent short term rating from one of these agencies, or (ii) a minimum insurer rating of "A" by A.M. Best. PJMSettlement will consider the lowest applicable rating to be the rating of the surety. If the rating of a surety providing a surety bond is lowered below A/A2 by any rating agency, then PJMSettlement may require the Participant to provide a surety bond from another surety that is rated A/A2 or better, or to provide another form of Collateral.

(ii) The surety bond shall have an initial period of at least one year, and shall state that it shall renew automatically for successive one-year periods, until terminated upon at least ninety (90) days prior written notice from the issuing surety. If PJM receives notice from the issuing surety that the current surety bond is being cancelled, the Participant will be required to provide evidence, acceptable to PJM, that such surety bond will be replaced with appropriate Collateral, effective as of the cancellation date of the surety bond, no later than thirty (30) days before the cancellation date of the surety bond, and no later than ninety (90) days after the notice of cancellation. Failure to do so will constitute a default under this Attachment Q and one of more of the Agreements enabling PJM to immediately demand payment of the full value of the surety bond.

(iii) PJM will post on its web site an acceptable standard form of a surety bond that should be utilized by a Participant choosing to submit a surety bond to establish credit at PJM. The acceptable standard form of surety bond will include non-negotiable provisions, including but not be limited to, a payment on demand feature, requirement that the bond be construed pursuant to Pennsylvania law, making the surety's obligation to pay out on the bond absolute and unconditional irrespective of the principal's (Market Participant's) bankruptcy, terms of any other agreements, investigation of the Market Participant by any entity or governmental authority, or PJM first attempting to collect payment from the Market Participant, and will require, among other things, that (a) the surety waive ***all*** rights that would be available to a principal or surety under the law, including but not limited to any right to investigate or verify any matter related to a demand for payment, rights to set-off amounts due by PJM to the Market Participant, and all counterclaims, (b) the surety expressly waive ***all*** of its and the principal's defenses, including illegality, fraud in the inducement, reliance on statements or representations of PJM and every other typically available defense; (c) the language of the bond that is determinative of the surety's obligation, and not the underlying agreement or arrangement between the principal and the oblige; (d) the bond shall not be conditioned on PJM first resorting to any other means of security or collateral, or pursuing any other remedies it may have; and (e) the surety acknowledge the continuing nature of its obligations in the event of termination or nonrenewal of the surety bond to make clear the surety remains liable for any obligations that arose before the effective date of its notice of cancellation of the surety bond. If the surety bond varies in any way from the standard format, it must first be reviewed and approved by PJM. PJM shall not accept any surety bond that varies in any material way from the standard format.

(iv) All costs associated with obtaining and maintaining a surety bond and meeting the Attachment Q provisions are the responsibility of the Participant.

(v) PJM shall not accept surety bonds with an aggregate value greater than $10 million dollars ($10,000,000) issued by any individual surety on behalf of any individual Participant.

(vi) PJM shall not accept surety bonds with an aggregate value greater than $50 million dollars ($50,000,000) issued by any individual surety.

E. PJM Administrative Charges

Collateral or credit support held by PJM shall also secure obligations to PJM for PJM administrative charges, and may be liquidated to satisfy all such obligations in an Event of Default.

F. Collateral and Credit Support Held by PJM

Collateral or credit support submitted by Participants and held by PJM shall be held by PJM for the benefit of PJM.

VI. SUPPLEMENTAL CREDIT REQUIREMENTS FOR SCREENED TRANSACTIONS

A. Virtual and Export Transaction Screening

1. Credit for Virtual and Export Transactions

Export Transactions and Virtual Transactions both utilize Credit Available for Virtual Transactions to support their credit requirements.

PJM does not require a Market Participant to establish separate or additional credit for submitting Virtual or Export Transactions; however, once transactions are submitted and accepted by PJM, PJM may require credit supporting those transactions to be held until the transactions are completed and their financial impact incorporated into the Market Participant's Obligations. If a Market Participant chooses to establish additional Collateral and/or Unsecured Credit Allowance in order to increase its Credit Available for Virtual Transactions, the Market Participant's Working Credit Limit for Virtual Transactions shall be increased in accordance with the definition thereof. The Collateral and/or Unsecured Credit Allowance available to increase a Market Participant's Credit Available for Virtual Transactions shall be the amount of Collateral and/or Unsecured Credit Allowance available after subtracting any credit required for Minimum Participation Requirements, FTR, RPM or other credit requirement determinants defined in this Attachment Q, as applicable.

If a Market Participant chooses to provide additional Collateral in order to increase its Credit Available for Virtual Transactions PJM may establish a reasonable timeframe, not to exceed three months, for which such Collateral must be maintained. PJM will not impose such restriction on a deposit unless a Market Participant is notified prior to making the deposit. Such restriction, if applied, shall be applied to all future deposits by all Market Participants engaging in Virtual Transactions.

A Market Participant may increase its Credit Available for Virtual Transactions by providing additional Collateral to PJM. PJM will make a good faith effort to make new Collateral available as Credit Available for Virtual Transactions as soon as practicable after confirmation of receipt. In any event, however, Collateral received and confirmed by noon on a Business Day will be applied (as provided under this Attachment Q) to Credit Available for Virtual Transactions no later than 10:00 am on the following Business Day. Receipt and acceptance of wired funds for cash deposit shall mean actual receipt by PJM's bank, deposit into PJM's customer deposit account, confirmation by PJM that such wire has been received and deposited, and entry into PJM's credit system. Receipt and acceptance of letters of credit or surety bonds shall mean receipt of the original Letter of Credit or surety bond, or amendment thereto, confirmation from PJM's credit and legal staffs that such Letter of Credit or surety bond, or amendment thereto conforms to PJM's requirements, which confirmation shall be made in a reasonable and practicable timeframe, and entry into PJM's credit system. To facilitate this process, bidders submitting additional Collateral for the purpose of increasing their Credit Available for Virtual Transactions are advised to submit such Collateral well in advance of the desired time, and to specifically notify PJM of such submission.

A Market Participant wishing to submit Virtual or Export Transactions must allocate within PJM's credit system the appropriate amount of Credit Available for Virtual Transactions to the virtual and export allocation sections within each customer account in which it wishes to submit such transactions.

2. Virtual Transaction Screening

All Virtual Transactions submitted to PJM shall be subject to a credit screen prior to acceptance in the Day-ahead Energy Market. The credit screen is applied separately for each of a Market Participant's customer accounts. The credit screen process will automatically reject Virtual Transactions submitted by the Market Participant in a customer account if the Market

Participant's Credit Available for Virtual Transactions, allocated on a customer account basis, is exceeded by the Virtual Credit Exposure that is calculated based on the Market Participant's Virtual Transactions submitted, as described below.

A Market Participant's Virtual Credit Exposure will be calculated separately for each customer account on a daily basis for all Virtual Transactions submitted by the Market Participant for the next Operating Day using the following equation:

Virtual Credit Exposure = INC and DEC Exposure + Up-to Congestion Exposure
Where:

(a) INC and DEC Exposure for each customer account is calculated as:

(i) ((the total MWh bid or offered, whichever is greater, hourly at each node) x the Nodal Reference Price x 1 day) summed over all nodes and all hours; plus (ii) ((the difference between the total bid MWh cleared and total offered MWh cleared hourly at each node) x Nodal Reference Price) summed over all nodes and all hours for the previous cleared Day-ahead Energy Market.

(b) Up-to Congestion Exposure for each customer account is calculated as:

(i) Total MWh bid hourly for each Up-to Congestion Transaction x (price bid – Up-to Congestion Reference Price) summed over all Up-to Congestion Transactions and all hours; plus (ii) Total MWh cleared hourly for each Up-to Congestion Transaction x (cleared price – Up-to Congestion Reference Price) summed over all Up-to Congestion Transactions and all hours for the previous cleared Day-ahead Energy Market, provided that hours for which the calculation for an Up-to Congestion Transaction is negative, it shall be deemed to have a zero contribution to the sum.

3. Export Transaction Screening

Export Transactions in the Real-time Energy Market shall be subject to Export Transaction Screening. Export Transaction Screening may be performed either for the duration of the entire Export Transaction, or separately for each time interval comprising an Export Transaction. PJM will deny or curtail all or a portion (based on the relevant time interval) of an Export Transaction if that Export Transaction, or portion thereof, would otherwise cause the Market Participant's Export Credit Exposure to exceed its Credit Available for Export Transactions. Export Transaction Screening shall be applied separately for each Operating Day and shall also be applied to each Export Transaction one or more times prior to the market clearing process for each relevant time interval. Export Transaction Screening shall not apply to transactions established directly by and between PJM and a neighboring Balancing Authority for the purpose of maintaining reliability.

A Market Participant's credit exposure for an individual Export Transaction shall be the MWh volume of the Export Transaction for each relevant time interval multiplied by each relevant

Export Transaction Price Factor and summed over all relevant time intervals of the Export Transaction.

B. RPM Auction and Price Responsive Demand Credit Requirements

Settlement during any Delivery Year of cleared positions resulting or expected to result from any RPM Auction shall be included as appropriate in Peak Market Activity, and the provisions of this Attachment Q shall apply to any such activity and obligations arising therefrom. In addition, the provisions of this section shall apply to any entity seeking to participate in any RPM Auction, to address credit risks unique to such auctions. The provisions of this section also shall apply under certain circumstances to PRD Providers that seek to commit Price Responsive Demand pursuant to the provisions of the Reliability Assurance Agreement.

Credit requirements described herein for RPM Auctions and RPM bilateral transactions are applied separately for each customer account of a Market Participant. Market Participants wishing to participate in an RPM Auction or enter into RPM bilateral transactions must designate the appropriate amount of credit to each account in which their offers are submitted.

1. Applicability

A Market Participant seeking to submit a Sell Offer in any RPM Auction based on any Capacity Resource for which there is a materially increased risk of nonperformance must satisfy the credit requirement specified herein before submitting such Sell Offer. A PRD Provider seeking to commit Price Responsive Demand for which there is a materially increased risk of non-performance must satisfy the credit requirement specified herein before it may commit the Price Responsive Demand. Credit must be maintained until such risk of non-performance is substantially eliminated, but may be reduced commensurate with the reduction in such risk, as set forth in section IV.B.3 below.

For purposes of this provision, a resource for which there is a materially increased risk of nonperformance shall mean: (i) a Planned Generation Capacity Resource; (ii) a Planned Demand Resource or an Energy Efficiency Resource; (iii) a Qualifying Transmission Upgrade; (iv) an existing or Planned Generation Capacity Resource located outside the PJM Region that at the time it is submitted in a Sell Offer has not secured firm transmission service to the border of the PJM Region sufficient to satisfy the deliverability requirements of the Reliability Assurance Agreement; or (v) Price Responsive Demand to the extent the responsible PRD Provider has not registered PRD-eligible load at a PRD Substation level to satisfy its Nominal PRD Value commitment, in accordance with Reliability Assurance Agreement, Schedule 6.1.

2. Reliability Pricing Model Auction and Price Responsive Demand Credit Requirement

Except as provided for Credit-Limited Offers below, for any resource specified in section IV.B.1 above, other than Price Responsive Demand, the credit requirement shall be the RPM Auction Credit Rate, as provided in section IV.B.4 below, times the megawatts to be offered for sale from such resource in an RPM Auction. For Qualified Transmission Upgrades, the credit requirements shall be based on the Locational Deliverability Area in which such upgrade was to increase the Capacity Emergency Transfer Limit. However, the credit requirement for Planned Financed Generation Capacity Resources and Planned External Financed Generation Capacity Resources shall be one half of the product of the RPM Auction Credit Rate, as provided in section IV.B.4 below, times the megawatts to be offered for sale from such resource in a Reliability Pricing Model Auction. The RPM Auction Credit Requirement for each Market Participant shall be determined on a customer account basis, separately for each customer account of a Market Participant, and shall be the sum of the credit requirements for all such resources to be offered by such Market Participant in the auction or, as applicable, cleared by such Market Participant in the relevant auctions. For Price Responsive Demand, the credit requirement shall be based on the Nominal PRD Value (stated in Unforced Capacity terms) times the Price Responsive Demand Credit Rate as set forth in section IV.B.5 below. Except for Credit-Limited Offers, the RPM Auction Credit requirement for a Market Participant will be reduced for any Delivery Year to the extent less than all of such Market Participant's offers clear in the Base Residual Auction or any Incremental Auction for such Delivery Year. Such reduction shall be proportional to the quantity, in megawatts, that failed to clear in such Delivery Year.

A Sell Offer based on a Planned Generation Capacity Resource, Planned Demand Resource, or Energy Efficiency Resource may be submitted as a Credit-Limited Offer. A Market Participant electing this option shall specify a maximum amount of Unforced Capacity, in megawatts, and a maximum credit requirement, in dollars, applicable to the Sell Offer. A Credit-Limited Offer shall clear the RPM Auction in which it is submitted (to the extent it otherwise would clear based on the other offer parameters and the system's need for the offered capacity) only to the extent of the lesser of: (i) the quantity of Unforced Capacity that is the quotient of the division of the specified maximum credit requirement by the Auction Credit Rate resulting from section IV.B.4.b. below; and (ii) the maximum amount of Unforced Capacity specified in the Sell Offer. For a Market Participant electing this alternative, the RPM Auction Credit requirement applicable prior to the posting of results of the auction shall be the maximum credit requirement specified in its Credit-Limited Offer, and the RPM Auction Credit requirement subsequent to posting of the results will be the Auction Credit Rate, as provided in section IV.B.4.b, c. or d. of this Attachment Q, as applicable, times the amount of Unforced Capacity from such Sell Offer that cleared in the auction. The availability and operational details of Credit-Limited Offers shall be as described in the PJM Manuals.

As set forth in section IV.B.4 below, a Market Participant's Auction Credit requirement shall be determined separately for each Delivery Year.

3. Reduction in Credit Requirement

As specified below, the RPM Auction Credit Rate may be reduced under certain circumstances after the auction has closed.

The Price Responsive Demand credit requirement shall be reduced as and to the extent the PRD Provider registers PRD-eligible load at a PRD Substation level to satisfy its Nominal PRD Value commitment, in accordance with Reliability Assurance Agreement, Schedule 6.1.

In addition, the RPM Auction Credit requirement for a Market Participant for any given Delivery Year shall be reduced periodically, after the Market Participant has provided PJM a written request for each reduction, accompanied by documentation sufficient for PJM to verify attainment of required milestones or satisfaction of other requirements, and PJM has verified that the Market Participant has successfully met progress milestones for its Capacity Resource that reduce the risk of non-performance, as follows:

(a) For Planned Demand Resources and Energy Efficiency Resources, the RPM Auction Credit requirement will be reduced in direct proportion to the megawatts of such Demand Resource that the Resource Provider qualifies as a Capacity Resource, in accordance with the procedures established under the Reliability Assurance Agreement.

(b) For Existing Generation Capacity Resources located outside the PJM Region that have not secured sufficient firm transmission to the border of the PJM Region prior to the auction in which such resource is first offered, the RPM Auction Credit requirement shall be reduced in direct proportion to the megawatts of firm transmission service secured by the Market Participant that qualify such resource under the deliverability requirements of the Reliability Assurance Agreement.

(c) For Planned Generation Capacity Resources located in the PJM Region, the RPM Auction Credit requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals.

Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Effective Date of Interconnection Service Agreement	50%
Financial Close	15%
Full Notice to Proceed and Commencement of Construction (e.g., footers poured)	5%
Main Power Generating Equipment Delivered	5%
Commencement of Interconnection Service	25%

For externally financed projects, the Market Participant must submit with its request for reduction a sworn, notarized certification of a duly authorized independent engineer for the Financial Close, Full Notice to Proceed and Commencement of Construction, and Main Power Generating Equipment Delivered milestones.

For internally financed projects, the Market Participant must submit with its request for reduction a sworn, notarized certification of a duly authorized officer of the Market Participant for the Financial Close milestone and either a duly authorized independent engineer or Professional Engineer for the Full Notice to Proceed and Commencement of Construction and the Main Power Generating Equipment Delivered milestones.

The required certifications must be in a form acceptable to PJM, certifying that the engineer or officer, as applicable, has personal knowledge, or has engaged in a diligent inquiry to determine, that the milestone has been achieved and that, based on its review of the relevant project information, the engineer or officer, as applicable, is not aware of any information that could reasonably cause it to believe that the Capacity Resource will not be in-service by the beginning of the applicable Delivery Year. The Market Participant shall, if requested by PJM, supply to PJM on a confidential basis all records and documents relating to the engineer's and/or officer's certifications.

(d) For Planned External Generation Capacity Resources, the RPM Auction Credit requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals; provided, however, that the total percentage reduction in the RPM Auction Credit requirement shall be no greater than the quotient of (i) the MWs of firm transmission service that the Market Participant has secured for the complete transmission path divided by (ii) the MWs of firm transmission service required to qualify such resource under the deliverability requirements of the Reliability Assurance Agreement.

Credit Reduction Milestones for Planned External Generation Capacity Resources	
Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Effective Date of the equivalent of an Interconnection Service Agreement	50%
Financial Close	15%
Full Notice to Proceed and Commencement of Construction (e.g., footers poured)	5%
Main Power Generating Equipment Delivered	5%
Commencement of Interconnection Service	25%

To obtain a reduction in its RPM Auction Credit requirement, the Market Participant must demonstrate satisfaction of the applicable milestone in the same manner as set forth for Planned Generation Capacity Resources in subsection (c) above.

(e) For Planned Financed Generation Capacity Resources located in the PJM Region, the RPM Auction Credit requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals.

Credit Reduction Milestones for Planned Financed Generation Capacity Resources	
Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Full Notice to Proceed	50%
Commencement of Construction (e.g., footers poured)	15%
Main Power Generating Equipment Delivered	10%
Commencement of Interconnection Service	25%

To obtain a reduction in its RPM Auction Credit requirement, the Market Participant must demonstrate satisfaction of the applicable milestone in the same manner as set forth for Planned Generation Capacity Resources in subsection (c) above.

(f) For Planned External Financed Generation Capacity Resources, the RPM Auction Credit Requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals; provided, however, that the total percentage reduction in the RPM Auction Credit requirement, including the initial 50% reduction for being a Planned External Financed Generation Capacity Resources, shall be no greater than the quotient of (i) the MWs of firm transmission service that the Market Participant has secured for the complete transmission path divided by (ii) the MWs of firm transmission service required to qualify such resource under the deliverability requirements of the Reliability Assurance Agreement.

Credit Reduction Milestones for Planned External Financed Generation Capacity	
Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Full Notice to Proceed	50%
Commencement of Construction (e.g., footers poured)	15%
Main Power Generating Equipment Delivered	10%
Commencement of Interconnection Service	25%

To obtain a reduction in its RPM Auction Credit requirement, the Market Participant must demonstrate satisfaction of the applicable milestone in the same manner as set forth for Planned Generation Capacity Resources in subsection (c) above.

(g) For Qualifying Transmission Upgrades, the RPM Auction Credit requirement shall be reduced to 50% of the amount calculated under section IV.B.2 above beginning as of the effective date of the latest associated Interconnection Service Agreement (or, when a project will have no such agreement, an Upgrade Construction Service Agreement), and shall be reduced to zero on the date the Qualifying Transmission Upgrade is placed in service.

4. RPM Auction Credit Rate

As set forth in the PJM Manuals, a separate Auction Credit Rate shall be calculated for each Delivery Year prior to each RPM Auction for such Delivery Year, as follows:

(a) Prior to the posting of the results of a Base Residual Auction for a Delivery Year, the Auction Credit Rate shall be:

(i) For all Capacity Resources other than Capacity Performance Resources, (the greater of (A) 0.3 times the Net Cost of New Entry for the PJM Region for such Delivery Year, in MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year; and

(ii) For Capacity Performance Resources, the greater of ((A) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year.

(iii) For Seasonal Capacity Performance Resources, the same as the Auction Credit Rate for Capacity Performance Resources, but reduced to be proportional to the number of calendar days in the relevant season.

(b) Subsequent to the posting of the results from a Base Residual Auction, the Auction Credit Rate used for ongoing credit requirements for supply committed in such auction shall be:

(i) For all Capacity Resources other than Capacity Performance Resources, (the greater of (A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located) times the number of calendar days in such Delivery Year; and

(ii) For Capacity Performance Resources, the (greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located) or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery year or for the Relevant LDA, in $/MW-day minus (the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located)] times the number of calendar days in such Delivery Year).

(iii) For Seasonal Capacity Performance Resources, the same as the Auction Credit Rate for Capacity Performance Resources, but reduced to be proportional to the number of calendar days in the relevant season.

(c) For any resource not previously committed for a Delivery Year that seeks to participate in an Incremental Auction, the Auction Credit Rate shall be:

(i) For all Capacity Resources other than Capacity Performance Resources, (the greater of (A) 0.3 times the Net Cost of New Entry for the PJM Region for such Delivery Year, in MW-day or (B) 0.24 times the Capacity Resource Clearing Price in the Base Residual Auction for such Delivery Year for the Locational Deliverability Area within which the resource is located or (C) $20 per MW-day) times the number of calendar days in such Delivery Year; and

(ii) For Capacity Performance Resources, the (greater of (A) 0.5 times Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA or (B) $20/MW-day) times the number of calendar days in such Delivery Year.

(d) Subsequent to the posting of the results of an Incremental Auction, the Auction Credit Rate used for ongoing credit requirements for supply committed in such auction shall be:

(i) For Base Capacity Resources: (the greater of (A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located) times the number of calendar days in such Delivery Year, but no greater than the Auction Credit Rate previously established for such resource's participation in such Incremental Auction pursuant to subsection (c) above) times the number of calendar days in such Delivery Year;

(ii) For Capacity Performance Resources, the greater of [(A) \$20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in \$/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery Year or for the Relevant LDA, in \$/MW-day minus (the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located)] times the number of calendar days in such Delivery Year); and

(iii) For Seasonal Capacity Performance Resources, the same as the Auction Credit Rate for Capacity Performance Resources, but reduced to be proportional to the number of calendar days in the relevant season.

(e) For the purposes of this section IV.B.4 and section IV.B.5 below, "Relevant LDA" means the Locational Deliverability Area in which the Capacity Performance Resource is located if a separate Variable Resource Requirement Curve has been established for that Locational Deliverability Area for the Base Residual Auction for such Delivery Year.

5. Price Responsive Demand Credit Rate

(a) For the 2018/2019 through 2022/2023 Delivery Years:

(i) Prior to the posting of the results of a Base Residual Auction for a Delivery Year, the Price Responsive Demand Credit Rate shall be (the greater of (A) 0.3 times the Net Cost of New Entry for the PJM Region for such Delivery Year, in MW-day or (B) \$20 per MW-day) times the number of calendar days in such Delivery Year;

(ii) Subsequent to the posting of the results from a Base Residual Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for Price Responsive Demand committed in such auction shall be (the greater of (A) \$20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand load is located, in \$/MW-day) times the number of calendar days in such Delivery Year times a final price uncertainty factor of 1.05;

(iii) For any additional Price Responsive Demand that seeks to commit in a Third Incremental Auction in response to a qualifying change in the final LDA load forecast, the Price Responsive Demand Credit Rate shall be the same as the rate for Price Responsive Demand that had cleared in the Base Residual Auction; and

(iv) Subsequent to the posting of the results of the Third Incremental Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for all Price Responsive Demand, shall be (the greater of (i) $20/MW-day or (ii) 0.2 times the Final Zonal Capacity Price for the Locational Deliverability Area within which the Price Responsive Demand is located) times the number of calendar days in such Delivery Year, but no greater than the Price Responsive Demand Credit Rate previously established under subsections (a)(i), (a)(ii), or (a)(iii) of this section for such Delivery Year.

(b) For the 2022/2023 Delivery Year and Subsequent Delivery Years:

(i) Prior to the posting of the results of a Base Residual Auction for a Delivery Year, the Price Responsive Demand Credit Rate shall be (the greater of (A) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year;

(ii) Subsequent to the posting of the results from a Base Residual Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for Price Responsive Demand committed in such auction shall be (the greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand is located, in $/MW-day or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery year or for the Relevant LDA, in $/MW-day minus (the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand is located)] times the number of calendar days in such Delivery Year;

(iii) For any additional Price Responsive Demand that seeks to commit in a Third Incremental Auction in response to a qualifying change in the final LDA load forecast, the Price Responsive Demand Credit Rate shall be (the greater of (A) 0.5 times Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (B) $20/MW-day) times the number of calendar days in such Delivery Year; and

(iv) Subsequent to the posting of the results of the Third Incremental Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for all Price Responsive Demand committed in such auction shall be the greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand is located or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day minus (the Capacity Performance Resource Clearing Price in such Incremental Auction for the Locational Deliverability Areas within which the Price

Responsive Demand is located)] times the number of calendar days in such Delivery Year.

6. RPM Seller Credit - Additional Form of Unsecured Credit for RPM

In addition to the forms of credit specified elsewhere in this Attachment Q, RPM Seller Credit shall be available to Market Participants, but solely for purposes of satisfying RPM Auction Credit requirements. If a supplier has a history of being a net seller into PJM Markets, on average, over the past 12 months, then PJM will count as available Unsecured Credit twice the average of that Market Participant's total net monthly PJM bills over the past 12 months. This RPM Seller Credit shall be subject to the cap on available Unsecured Credit as established in section II.G.3 above.

RPM Seller Credit is calculated as a single value for each Market Participant, not separately by account, and must be designated to specific customer accounts in order to be available to satisfy RPM Auction Credit requirements that are calculated in each such customer account.

7. Credit Responsibility for Traded Planned RPM Capacity Resources

PJM may require that credit and financial responsibility for planned Capacity Resources that are traded remain with the original party (which for these purposes, means the party bearing credit responsibility for the planned Capacity Resource immediately prior to trade) unless the receiving party independently establishes consistent with this Attachment Q, that it has sufficient credit with PJM and agrees by providing written notice to PJM that it will fully assume the credit responsibility associated with the traded planned Capacity Resource.

C. Financial Transmission Right Auctions

Credit requirements described herein for FTR activity are applied separately for each customer account of a Market Participant, unless specified otherwise in this section C. FTR Participants must designate the appropriate amount of credit to each separate customer account in which any activity occurs or will occur.

1. FTR Credit Limit.

Participants must maintain their FTR Credit Limit at a level equal to or greater than their FTR Credit Requirement for each applicable account. FTR Credit Limits will be established only by a Participant providing Collateral and designating the available credit to specific accounts.

2. FTR Credit Requirement.

For each Market Participant with FTR activity, PJM shall calculate an FTR Credit Requirement. The FTR Credit Requirement shall be calculated on a portfolio basis for each Market Participant based on (a) initial margin, (b) Auction Revenue Right Credits, (c) Mark-to-Auction Value, (d) application of a 10¢ per MWh minimum value adjustment, and (e) realized gains and/or losses, as set forth in subsections (a)-(e) of this subsection, employing the formula:

Max { Max (IM – ARR – MTA, Ten Cent per Mwh Minimum) – Realized Gains and/or Losses, 0}

Where IM is the initial margin, ARR is Auction Revenue Rights Credits and MTA is the Mark-to-Auction Value. The FTR Credit Requirement ~~based on FTR cost, FTR Historical Value and MWh volume, anticipated FTR activity for new Market Participants, and anticipated change in exposure for existing Market Participants newly participating in the FTR market, and~~ may be increased to reflect any change in the value of a Market Participant's portfolio requiring an increase in Collateral ~~exposure based on the most recent applicable FTR auction prices,~~ as further described below.

(a) Initial Margin

Initial margin shall be calculated in accordance with the following formula:

IM = FTR Obligations IM + FTR Options IM

The model will employ a confidence interval of 97 percent.

(i) FTR Obligations IM

Initial margin values for Financial Transmission Right Obligations shall be determined utilizing a historical simulation value-at-risk methodology that calculates the size and value at risk of the applicable FTR portfolio based on a defined confidence interval and subject to a weighted aggregation method that is represented by a straight sum for long term positions and a combination of straight sum (20%) and weighted root sum of squares (80%) for balance of planning period positions.

(ii) FTR Options IM

The initial margin for Financial Transmission Right Options shall be calculated as the FTR cost minus the FTR Historical Values. FTR Historical Values shall be calculated separately for on-peak, off-peak, and 24-hour FTRs for each month of the year. FTR Historical Values shall be adjusted by plus or minus ten percent for cleared counter flow or prevailing flow FTRs, respectively, in order to mitigate exposure due to uncertainty and fluctuations in actual FTR value. Historical values used in the calculation of FTR Historical Values shall be adjusted when the network simulation model utilized in PJM's economic planning process indicates that transmission congestion will decrease due to certain transmission upgrades that are in effect or planned to go into effect for the following Planning Period. The transmission upgrades to be modeled for this purpose shall only include those upgrades that, individually, or together, have 10% or more impact on the transmission congestion on an individual constraint or constraints with congestion of $5 million or more affecting a common congestion path. The adjustments to historical values shall be the dollar amount of the adjustment shown in the network simulation model.

(b) Auction Revenue Rights Credits

For a given month for which initial margin is calculated, the prorated value of any Auction Revenue Rights Credits held by a Market Participant with Financial Transmission Right Obligations shall be subtracted from the initial margin for that month. In accordance with subsection 3 below, PJM may recalculate Auction Revenue Rights Credits at any time, but shall do so no less frequently than subsequent to each annual FTR auction. If a reduction in such ARR credits at any time increases an FTR Participant's FTR Credit Requirements beyond its credit available for FTR activity, the FTR Participant must increase its Collateral or the FTR Credit Limit.

(c) Mark-to-Auction Value

A Mark-to-Auction Value shall be calculated for each Market Participant in accordance with subsection 7 below.

(d) Ten Cent (10¢) per MWh Minimum Value Adjustment

If the FTR Credit Requirement as calculated pursuant to subsections (a)-(c) above~~cost less the FTR Historical Value, plus any applicable increase related to portfolio diversification as described in section C.6 below~~, results in a value that is less than ten cents (10¢) per MWh, the FTR Credit Requirement shall be increased to ten cents (10¢) per MWh. When calculating the portfolio MWh for this comparison, for cleared "Sell" FTRs, the MWh shall be subtracted from the portfolio total; prior to clearing, the MWh for "Sell" FTRs shall not be included in the portfolio total. ~~FTR Credit Requirements shall be further adjusted by ARR credits available and by an amount based on portfolio diversification, if applicable. The requirement will be based on individual monthly exposures which are then used to derive a total requirement.~~

~~The FTR Credit Requirement shall be calculated by first adding for each month the FTR Monthly Credit Requirement Contribution for each submitted, accepted, and cleared FTR and then subtracting the prorated value of any ARRs held by the Market Participant for that month. The resulting twelve monthly subtotals represent the expected value of net payments between PJM and the Market Participant for FTR activity each month during the Planning Period. Subject to later adjustment by an amount based on portfolio diversification, if applicable, and subject to later adjustment for auction prices, the FTR Credit Requirement shall be the sum of the individual positive monthly subtotals, representing months in which net payments to PJM are expected.~~

(e) Realized Gains and/or Losses
Any realized gains and/or losses resulting from the sale of Financial Transmission Right Obligations will be subtracted from the FTR Credit Requirement. A realized gain will decrease the FTR Credit Requirement (but not below $0.00), whereas a realized loss will increase the FTR Credit Requirement.

3. Rejection of FTR Bids.

Bids submitted into an auction will be rejected if the Market Participant's FTR Credit Requirement including such submitted bids would exceed the Market Participant's FTR Credit Limit, or if the Market Participant fails to provide ~~additional credit support or~~ additional Collateral as required pursuant to provisions related to ~~portfolio diversification and~~ mark-to-auction.

4. FTR Credit Collateral Returns.

A Market Participant may request from PJM the return of any Collateral no longer required for the FTR markets. PJM is permitted to limit the frequency of such requested Collateral returns, provided that Collateral returns shall be made by PJM at least once per calendar quarter, if requested by a Market Participant.

5. Credit Responsibility for Bilateral Transfers of FTRs.

PJM may require that credit responsibility associated with an FTR bilaterally transferred to a new Market Participant remain with the original party (which for these purposes, means the party bearing credit responsibility for the FTR immediately prior to bilateral transfer) unless and until the receiving party independently establishes, consistent with this Attachment Q, sufficient credit with PJM and agrees through confirmation of the bilateral transfer in PJM's FTR reporting tool that it will meet in full the credit requirements associated with the transferred FTR.

~~**6. Portfolio Diversification.**~~

~~Portfolio diversification shall be calculated, and the appropriate provisions herein applied, separately for each customer account of a Market Participant, and separately for each month.~~

~~Subsequent to calculating a tentative cleared solution for an FTR auction (or auction round), PJM shall determine the FTR Portfolio Auction Value for each customer account of a Market Participant, including the tentative cleared solution. Any customer accounts with such FTR Portfolio Auction Values that are negative in one or more months shall be deemed "FTR Flow Undiversified."~~

~~For customer accounts that are FTR Flow Undiversified in a month, PJM shall increment the FTR Credit Requirement by an amount equal to three times the absolute value of the FTR Portfolio Auction Value in that month, including the tentative cleared solution. For portfolios that are FTR Flow Undiversified in months subsequent to the current planning year, these incremental amounts, calculated on a monthly basis, shall be reduced (but not below zero) by an amount up to 25% of the monthly value of ARR credits that are held by a Market Participant. Subsequent to the ARR allocation process preceding an annual FTR auction, such ARRs credits shall be reduced to zero for months associated with that ARR allocation process. PJM may recalculate such ARR credits at any time, but at a minimum shall do so subsequent to each annual FTR auction. If a reduction in such ARR credits at any time increases an FTR Participant's FTR Credit Requirements beyond its credit available for FTR activity, the FTR Participant must increase its credit to eliminate the shortfall in the applicable customer account(s).~~

~~If the FTR Credit Requirement for any Market Participant's customer account exceeds its credit available for FTRs as a result of these diversification requirements for the tentatively cleared portfolio of FTRs, PJM shall immediately issue a demand for additional credit, and such demand must be fulfilled before 4:00 p.m. on the Business Day following the demand. If any Market Participant does not timely satisfy such demand, PJM shall cause the removal of that Market~~

~~Participant's entire set of bids in that account for that FTR auction (or auction round) and a new cleared solution shall be calculated for the entire auction (or auction round).~~

~~If necessary, PJM shall repeat the auction clearing calculation. PJM shall repeat these portfolio diversification calculations subsequent to any secondary clearing calculation, and PJM shall require affected Market Participants to establish additional credit.~~

6~~7~~. FTR Administrative Charge Credit Requirement

In addition to any other credit requirements, PJM may apply a credit requirement to cover the maximum administrative fees that may be charged to a Market Participant for its bids and offers.

~~**8. Long-Term FTR Credit Recalculation**~~

~~Long-term FTR Credit Requirement calculations shall be updated annually for known history, consistent with updating of historical values used for FTR Credit Requirement calculations in the annual auctions. If the historical value update results in an FTR Credit Requirement for any Market Participant's customer account that exceeds its credit available for FTR activity, then PJM shall issue a Collateral Call equal to the lesser of the increase in the FTR Credit Requirement from the historical value adjustment and the credit shortfall after the historical value adjustment.~~

7~~9~~. Mark-to-Auction

A Mark-to-Auction Value shall be calculated separately for each customer account of a Market Participant. For each such customer account, the Mark-to-Auction Value shall be a single number equal to the sum, over all months remaining in the applicable FTR period and for all cleared FTRs in the customer account, of the most recently available cleared auction price applicable to the FTR minus the original transaction price of the FTR, multiplied by the transacted quantity.

The FTR Credit Requirement, as otherwise described above, shall be increased when the Mark-to-Auction Value is negative and decreased when the Mark-to-Auction Value is positive. The increase shall equal the absolute value of the negative Mark-to-Auction Value less the value of ARR credits that are held in the customer account and have not been used to reduce the FTR Credit Requirement prior to application of the Mark-to-Auction Value. PJM shall recalculate ARR credits held by each Market Participant after each annual FTR auction and may also recalculate such ARR credits at any other additional time intervals it deems appropriate. Application of the Mark-to-Auction Value, including the effect from ARR application, shall not decrease the FTR Credit Requirement below the Ten Cent (10¢) per MWh Minimum.

For Market Participant customer accounts for which FTR bids have been submitted into the current FTR auction, if the Market Participant's FTR Credit Requirement exceeds its credit available ~~for FTRs as a result of the mark-to-auction requirements~~ for the Market Participant's portfolio of FTRs in the tentative cleared solution for an FTR auction (or auction round), PJM shall issue a Collateral Call to the Market Participant, and the Market Participant must fulfill such demand before 4:00 p.m. Eastern Prevailing Time on the following Business Day. If a Market Participant does not timely satisfy such Collateral Call, PJM shall, in coordination with PJM, cause the removal of all of that Market Participant's bids in that FTR auction (or auction round), submitted from such Market Participant's customer account, and a new cleared solution shall be calculated for the FTR auction (or auction round).

If necessary, PJM shall repeat the auction clearing calculation. PJM shall repeat these mark-to-auction calculations subsequent to any secondary clearing calculation, and PJM shall require affected Market Participants to establish additional credit.

Subsequent to final clearing of an FTR auction or an annual FTR auction round, PJM shall recalculate the FTR Credit Requirement for all FTR portfolios, and, as applicable, issue to each Market Participant a request for Collateral~~an MTA Collateral Call~~ for the total amount by which the FTR Credit Requirement exceeds the credit allocated in any of the Market Participant's accounts. The Market Participant must fulfill such demand by 4:00 p.m. Eastern Prevailing Time on the following Business Day.

If the request for Collateral ~~MTA Collateral Call~~ is not satisfied within the applicable cure period referenced in Operating Agreement, section 15, then such Market Participant shall be restricted in all of its credit-screened transactions. Specifically, such Market Participant may not engage in any Virtual Transactions or Export Transactions, or participate in RPM Auctions or other RPM activity. Such Market Participant may engage only in the selling of open FTR positions, either in FTR auctions or bilaterally, provided such sales would reduce the Market Participant's FTR Credit Requirements. PJM shall not return any Collateral to such Market Participant, and no payment shall be due or payable to such Market Participant, until its credit shortfall is remedied. Market Participant shall allocate any excess or unallocated Collateral to any of its account in which there is a credit shortfall. Market Participants may remedy their credit shortfall at any time through provision of sufficient Collateral.

If a Market Participant fails to satisfy ~~MTA Collateral Calls~~a request for Collateral for two consecutive auctions of overlapping periods, e.g. two balance of Planning Period auctions, an annual FTR auction and a balance of Planning Period auction, or two long term FTR auctions, (for this purpose the four rounds of an annual FTR auction shall be considered a single auction), the Market Participant shall be declared in default of this Attachment Q.

VII. PEAK MARKET ACTIVITY AND WORKING CREDIT LIMIT

A. Peak Market Activity Credit Requirement

PJM shall calculate a Peak Market Activity credit requirement for each Participant. Each Participant must maintain sufficient Unsecured Credit Allowance and/or Collateral, as applicable, and subject to the provisions herein, to satisfy its Peak Market Activity credit requirement.

Peak Market Activity for Participants will be determined semi-annually, utilizing an initial Peak Market Activity, as explained below, calculated after the first complete billing week in the

months of April and October. Peak Market Activity shall be the greater of the initial Peak Market Activity, or the greatest amount invoiced for the Participant's transaction activity for all PJM Markets and services in any rolling one, two, or three week period, ending within a respective semi-annual period. However, Peak Market Activity shall not exceed the greatest amount invoiced for the Participant's transaction activity for all PJM Markets and services in any rolling one, two or three week period in the prior 52 weeks.
Peak Market Activity shall exclude FTR Net Activity, Virtual Transactions Net Activity, and Export Transactions Net Activity.

When calculating Peak Market Activity, PJM may attribute credits for Regulation service to the days on which they were accrued, rather than including them in the month-end invoice.

The initial Peak Market Activity for Applicants will be determined by PJM based on a review of an estimate of their transactional activity for all PJM Markets and services over the next 52 weeks, which the Applicant shall provide to PJM.

The initial Peak Market Activity for Market Participants and Transmission Customers, calculated at the beginning of each semi-annual period, shall be the three-week average of all non-zero invoice totals over the previous 52 weeks. This calculation shall be performed and applied within three (3) Business Days following the day the invoice is issued for the first full billing week in the current semi-annual period.

Prepayments shall not affect Peak Market Activity unless otherwise agreed to in writing pursuant to this Attachment Q.

Peak Market Activity calculations shall take into account reductions of invoice values effectuated by early payments which are applied to reduce a Participant's Peak Market Activity as contemplated by other terms of this Attachment Q; provided that the initial Peak Market Activity shall not be less than the average value calculated using the weeks for which no early payment was made.

A Participant may reduce its Collateral requirement by agreeing in writing (in a form acceptable to PJM) to make additional payments, including prepayments, as and when necessary to ensure that such Participant's Total Net Obligation at no time exceeds such reduced Collateral requirement.

PJM may, at its discretion, adjust a Participant's Peak Market Activity requirement if PJM determines that the Peak Market Activity is not representative of such Participant's expected activity, as a consequence of known, measurable, and sustained changes. Such changes may include, but shall not be limited to when a Participant makes PJM aware of federal, state or local law that could affect the allocation of charges or credits from a Participant to another party, the loss (without replacement) of short-term load contracts, when such contracts had terms of three months or more and were acquired through state-sponsored retail load programs, but shall not include short-term buying and selling activities.

PJM may waive the credit requirements for a Participant that has no outstanding transactions and agrees in writing that it shall not, after the date of such agreement, incur obligations under any of the Agreements. Such entity's access to all electronic transaction systems administered by PJM shall be terminated.

A Participant receiving unsecured credit may make early payments up to ten times in a rolling 52-week period in order to reduce its Peak Market Activity for credit requirement purposes. Imputed Peak Market Activity reductions for credit purposes will be applied to the billing period for which the payment was received. Payments used as the basis for such reductions must be received prior to issuance or posting of the invoice for the relevant billing period. The imputed Peak Market Activity reduction attributed to any payment may not exceed the amount of Unsecured Credit for which the Participant is eligible.

B. Working Credit Limit

PJM will establish a Working Credit Limit for each Participant against which its Total Net Obligation will be monitored.
If a Participant's Total Net Obligation approaches its Working Credit Limit, PJM may require the Participant to make an advance payment or increase its Collateral in order to maintain its Total Net Obligation below its Working Credit Limit. Except as explicitly provided herein, advance payments shall not serve to reduce the Participant's Peak Market Activity for the purpose of calculating credit requirements.

> Example: After ten (10) calendar days, and with five (5) calendar days remaining before the bill is due to be paid, a Participant approaches its $4.0 million Working Credit Limit. PJM may require a prepayment of $2.0 million in order that the Total Net Obligation will not exceed the Working Credit Limit.

If a Participant exceeds its Working Credit Limit or is required to make advance payments more than ten times during a 52-week period, PJM may require Collateral in an amount as may be deemed reasonably necessary to support its Total Net Obligation.

When calculating Total Net Obligation, PJM may attribute credits for Regulation service to the days on which they were accrued, rather than including them in the month-end invoice.

VIII. SUSPENSION OR LIMITATION ON MARKET PARTICIPATION

If PJM determines that a Participant presents an unreasonable credit risk as determined pursuant to initial or ongoing risk evaluations, as described in section II above, or in the case of any other event which, after notice, lapse of time, or both, would result in an Event of Default, PJM will take steps to mitigate the exposure of any PJM Markets, which may include, but is not limited to, requiring Collateral, additional Collateral or Restricted Collateral or suspending or limiting the Market Participant's ability to participate in the PJM Markets commensurate to the risk to any PJM Markets.

If a Participant fails to reduce or eliminate any unreasonable credit risks to PJM's satisfaction within the applicable cure period including without limitation by posting Collateral, additional Collateral or Restricted Collateral, PJM may treat such failure as an Event of Default.

Notwithstanding the foregoing, a Participant that transacts in FTRs will be eligible to request that PJM exempt or exclude FTR transactions of such Participant from the effect of any such limitations on market activity established by PJM, and PJM may but shall not be required to so exempt or exclude, any FTR transactions that the Participant reasonably demonstrates to PJM it has entered into to "hedge or mitigate commercial risk" arising from its transactions in the PJM Interchange Energy Market that are intended to result in the actual flow of physical energy or ancillary services in the PJM Region, as the phrase "hedge or mitigate commercial risks" is defined under the CFTC's regulations defining the end-user exception to clearing set forth in 17 C.F.R. §50.50(c).

IX. REMEDIES FOR CREDIT BREACH, FINANCIAL DEFAULT OR CREDIT SUPPORT DEFAULT; REMEDIES FOR EVENTS OF DEFAULT

If PJM determines that a Market Participant is in Credit Breach, or that a Financial Default or Credit Support Default exists, PJM may issue to the Market Participant a breach notice and/or a Collateral Call or demand for additional documentation or assurances. At such time, PJM may also suspend payments of any amounts due to the Participant and limit, restrict or rescind the Market Participant's privileges to participate in any or all PJM Markets under the Agreements during any such cure period. Failure to remedy the Credit Breach, Financial Default or to satisfy a Collateral Call or demand for additional documentation or assurances within the applicable cure period described in Operating Agreement, section 15.1.5, shall constitute an Event of Default. If a Participant fails to meet the requirements of this Attachment Q, but then remedies the Credit Breach, Financial Default or Credit Support Default, or satisfies a Collateral Call or demand for additional documentation or assurances within the applicable cure period, then the Participant shall be deemed to again be in compliance with this Attachment Q, so long as no other Credit Breach, Financial Default, Credit Support Default or Collateral Call or demand for additional documentation or assurances has occurred and is continuing.

Only one cure period shall apply to a single event giving rise to a Credit Breach, Financial Default or Credit Support Default. Application of Collateral towards a Financial Default, Credit Breach or Credit Support Breach shall not be considered a cure of such Credit Breach, Financial Default or Credit Support Default unless the Participant is determined by PJM to be in full compliance with all requirements of this Attachment Q after such application.

When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM may take such actions as may be required or permitted under the Agreements to protect the PJM Markets and the PJM Members, including but not limited to (a) suspension and/or termination of the Participant's ongoing Transmission Service, (b) limitation, suspension and/or termination of participation in any PJM Markets, (c) close out and liquidation of the Market Participant's market portfolio, exercising judgment in the manner in which this is achieved in any PJM Markets. When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM also has the immediate right to liquidate all or a portion of a Participant's Collateral at its discretion to satisfy Total Net Obligations to PJM under this Attachment Q or one or more of the Agreements. No remedy for an Event of Default is or shall be deemed to be exclusive of any other available remedy or remedies by contract or under applicable laws and regulations. Each such remedy shall be distinct, separate and cumulative, shall not be deemed inconsistent with or in exclusion of any other available remedy, and shall be in addition to and separate and distinct from every other remedy.

When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM may continue to retain all payments due to a Participant as a cash security for all such Participant's obligations under the Agreements (regardless of any restrictions placed on such Participant's use of Collateral for any account, market activity or capitalization purpose); provided, however, that an Event of Default will not be deemed cured or no longer continuing because PJM is retaining amounts due the Participant, or because PJM has not yet applied Collateral or credit support to any amounts due PJM, unless PJM determines that the Participant has again satisfied all the Collateral requirements and application requirements as a new Applicant for participation in the PJM Markets, and consistent with the requirements and limitations of Operating Agreement, section 15.

In Event of Default by a Participant, PJM may exercise any remedy or action allowed or prescribed by this Attachment Q immediately or following investigation and determination of an orderly exercise of such remedy or action. Delay in exercising any allowed remedy or action shall not preclude PJM from exercising such remedy or action at a later time.

PJM may hold a defaulting Participant's Collateral for as long as such party's positions exist and consistent with this Attachment Q, in order to protect the PJM Markets and PJM's membership, and minimize or mitigate the impacts or potential impacts or risks associated with such Event of Default when an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing.

PJM may apply towards an ongoing Event of Default any amounts that are held or later become available or due to the defaulting Participant through PJM's markets and systems.

In order to cover the Participant's Obligations, PJM may hold a Participant's Collateral indefinitely and specifically through the end of the billing period which includes the 90th day following the last day a Participant had activity, open positions, or accruing obligations (other than reconciliations and true-ups), until such Participant has satisfactorily paid any obligations invoiced through such period and until PJM determines that the Participant's positions represent no risk exposure to the PJM Markets or the PJM Members. Obligations incurred or accrued through such period shall survive any withdrawal from PJM. When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM may apply any Collateral to such Participant's Obligations, even if Participant had previously announced and effected its withdrawal from PJM.

X. FTRS UNDER THE COMMODITY EXCHANGE ACT AND THE BANKRUPTCY CODE

Under the terms of the Tariff, PJM Settlement is the counterparty to all transactions in PJM Markets, including but not limited to all FTR transactions, other than (i) any bilateral transactions between Participants, or (ii) with respect to self-supplied or self-scheduled transactions reported to the Office of the Interconnection. Pursuant to the "Final Order in Response to a Petition From Certain Independent System Operators and Regional Transmission Organizations To Exempt Specified Transactions Authorized by a Tariff or Protocol Approved by the Federal Energy Regulatory Commission or the Public Utility Commission of Texas From Certain Provisions of the Commodity Exchange Act Pursuant to the Authority Provided in the Act" 78 Fed. Reg. 19880 (April 2, 2013) (the "CFTC RTO/ISO Order"), the Commodity Futures Trading Commission (the "CFTC") exempts transactions offered or entered into in a market administered by PJM pursuant to the Tariff, including but not limited to FTR transactions, from the provisions of the Commodity Exchange Act and the CFTC's rules applicable to "swaps," with the exception of the CFTC's general anti-fraud and anti-manipulation authority and scienter-based prohibitions.

Notwithstanding the CFTC RTO/ISO Order, for purposes of the United States Bankruptcy Code ("Bankruptcy Code"), all FTR transactions constitute "swap agreements" and/or "forward contracts," and PJM and each FTR Participant is a "forward contract merchant" and/or a "swap participant" within the meaning of the Bankruptcy Code for purposes of FTR transactions.

Pursuant to this Attachment Q and other provisions of the Agreements, PJM already has, and shall continue to have, the following rights (among other rights) with respect to a Market Participant's Event of Default: (a) the right to terminate and/or liquidate any FTR transaction held by that Market Participant; (b) the right to immediately proceed against any Collateral provided by the Market Participant; (c) the right to set-off any obligations due or owing to that Market Participant pursuant to any forward contract, swap agreement, or similar agreement against any amounts due and owing by that Market Participant pursuant to any forward contract, swap agreement, or similar agreement, such arrangement to constitute a "master netting agreement" within the meaning of the Bankruptcy Code; and (d) the right to suspend or limit that Market Participant from entering into further FTR transactions.

For the avoidance of doubt, upon the commencement of a voluntary or involuntary proceeding for a Participant under the Bankruptcy Code, and without limiting any other rights of PJM or obligations of any Participant under the Agreements, PJM may exercise any of its rights against such Participant, including, without limitation (1) the right to terminate and/or liquidate any FTR transaction held by that Participant, (2) the right to immediately proceed against any Collateral provided by that Participant, (3) the right to set off any obligations due and owing to that Participant pursuant to any forward contract, swap agreement and/or master netting agreement against any amounts due and owing by that Participant with respect to an FTR transaction including as a result of the actions taken by PJM pursuant to (a) above, and 4) the right to suspend or limit that Participant from entering into future FTR transactions.

For purposes of the Bankruptcy Code, all transactions, including but not limited to FTR transactions, between PJM, on the one hand, and a Market Participant, on the other hand, are intended to be part of a single integrated agreement, and together with the Agreements constitute a "master netting agreement."

Attachment Q
Appendix 1

PJM MINIMUM PARTICIPATION CRITERIA
ANNUAL OFFICER CERTIFICATION FORM

Participant Name: ____ ("Participant")

I, ____, a duly authorized officer of Participant, understanding that PJM Interconnection, L.L.C. and PJMSettlement, Inc. ("PJMSettlement") are relying on this certification as evidence that Participant meets the minimum requirements set forth in the PJM Open Access Transmission Tariff ("PJM Tariff"), Attachment Q hereby certify that I have full authority to represent on behalf of Participant and further represent as follows, as evidenced by my initialing each representation in the space provided below:

1. All employees or agents transacting in markets or services provided pursuant to the PJM Tariff or PJM Amended and Restated Operating Agreement ("PJM Operating Agreement") on behalf of the Participant have received appropriate training and are authorized to transact on behalf of Participant. As used in this representation, the term "appropriate" as used with respect to training means training that is (i) comparable to generally accepted practices in the energy trading industry, and (ii) commensurate and proportional in sophistication, scope and frequency to the volume of transactions and the nature and extent of the risk taken by the participant._________

2. Participant has written risk management policies, procedures, and controls, approved by Participant's independent risk management function and applicable to transactions in any PJM Markets in which it participates and for which employees or agents transacting in markets or services provided pursuant to the PJM Tariff or PJM Operating Agreement have been trained, that provide an appropriate, comprehensive risk management framework that, at a minimum, clearly identifies and documents the range of risks to which Participant is exposed, including, but not limited to credit risks, liquidity risks and market risks. As used in this representation, a Participant's "independent risk management function" can include appropriate corporate persons or bodies that are independent of the Participant's trading functions, such as a risk management committee, a risk officer, a Participant's board or board committee, or a board or committee of the Participant's parent company.

    a. Participant is providing to PJM or PJMSettlement, in accordance with Tariff, Attachment Q, section III, with this Annual Officer Certification Form, a copy of its current governing risk management policies, procedures and controls applicable to its activities in any PJM Markets pursuant to Attachment Q or because there have been substantive changes made to such policies, procedures and controls applicable to its market activities since they were last provided to PJM.__________

    b. If the risk management policies, procedures and controls applicable to Participant's market activities submitted to PJM or PJMSettlement were submitted prior to the current certification, Participant certifies that no substantive changes have been made to such policies, procedures and controls applicable to its market activities since such submission.__________

3. An FTR Participant must make either the following 3.a. or 3.b. additional representations, evidenced by the undersigned officer initialing either the one 3.a. representation or the four 3.b. representations in the spaces provided below:

    a. Participant transacts in PJM's FTR markets with the sole intent to hedge congestion risk in connection with either obligations Participant has to serve load or rights Participant has to generate electricity in the PJM Region ("physical transactions") and monitors all of the Participant's FTR market activity to endeavor to ensure that its FTR positions, considering both the size and pathways of the positions, are either generally proportionate to or generally do not exceed the Participant's physical transactions, and remain generally consistent with the Participant's intention to hedge its physical transactions.__________

    b. On no less than a weekly basis, Participant values its FTR positions and engages in a probabilistic assessment of the hypothetical risk of such positions using analytically based methodologies, predicated on the use of industry accepted valuation methodologies.__________

    Such valuation and risk assessment functions are performed either by persons within Participant's organization independent from those trading in PJM's FTR markets or by an outside firm qualified and with expertise in this area of risk management.__________

    Having valued its FTR positions and quantified their hypothetical risks, Participant applies its written policies, procedures and controls to limit its risks using industry recognized practices, such as value-at-risk limitations, concentration limits, or other controls designed to prevent Participant from purposefully or unintentionally taking on risk that is not commensurate or proportional to Participant's financial capability to manage such risk.__________

    Exceptions to Participant's written risk policies, procedures and controls applicable to Participant's FTR positions are documented and explain a reasoned basis for the granting of any exception.__________

4. Participant has appropriate personnel resources, operating procedures and technical abilities to promptly and effectively respond to all PJM and PJMSettlement communications and directions.__________

5. Participant has demonstrated compliance with the Minimum Capitalization criteria set forth in Tariff, Attachment Q that are applicable to any PJM Markets in which Participant transacts, and is not aware of any change having occurred or being imminent that would invalidate such compliance.__________

6. All Participants must certify and initial in at least one of the four sections below:

a. I certify that Participant qualifies as an "appropriate person" as that term is defined under section 4(c)(3), or successor provision, of the Commodity Exchange Act or an "eligible contract participant" as that term is defined under section 1a(18), or successor provision, of the Commodity Exchange Act. I certify that Participant will cease transacting in any PJM Markets and notify PJM and PJMSettlement immediately if Participant no longer qualifies as an "appropriate person" or "eligible contract participant."__________

   If providing audited financial statements, which shall be in US GAAP format or any other format acceptable to PJM, to support Participant's certification of qualification as an "appropriate person:"

      I certify, to the best of my knowledge and belief, that the audited financial statements provided to PJM and/or PJMSettlement present fairly, pursuant to such disclosures in such audited financial statements, the financial position of Participant as of the date of those audited financial statements. Further, I certify that Participant continues to maintain the minimum $1 million total net worth and/or $5 million total asset levels reflected in these audited financial statements as of the date of this certification. I acknowledge that both PJM and PJMSettlement are relying upon my certification to maintain compliance with federal regulatory requirements.__________

   If not providing audited financial statements to support Participant's certification of qualification as an "appropriate person," Participant certifies that they qualify as an "appropriate person" under one of the entities defined in section 4(c)(3)(A)-(J) of the Commodities Exchange Act. __________

   If providing audited financial statements, which shall be in US GAAP format or any other format acceptable to PJM, to support Participant's certification of qualification as an "eligible contract participant:"

      I certify, to the best of my knowledge and belief, that the audited financial statements provided to PJM and/or PJMSettlement present fairly, pursuant to such disclosures in such audited financial statements, the financial position of Participant as of the date of those audited financial statements. Further, I certify that Participant continues to maintain the minimum $1 million total net worth and/or $10 million total asset levels reflected in these audited financial statements as of the date of this certification. I acknowledge that both PJM and PJMSettlement are relying upon my certification to maintain compliance with federal regulatory requirements.__________

      If not providing audited financial statements to support Participant's certification of qualification as an "eligible contract participant," Participant certifies that they qualify as an "eligible contract participant" under one of the entities defined in section 1a(18)(A) of the Commodities Exchange Act. __________

b. I certify that Participant has provided an unlimited Corporate Guaranty in a form acceptable to PJM as described in Tariff, Attachment Q, section III.D from an issuer that has at least $1 million of total net worth or $5 million of total assets per Participant for which the issuer has issued an unlimited Corporate Guaranty. I also certify, to the best of my knowledge and belief, that the audited financial statements provided to PJM and/or PJMSettlement present fairly, pursuant to such disclosures in such audited financial statements, the financial position of the issuer as of the date of those audited financial statements. Further, I certify that Participant will cease transacting PJM's Markets and notify PJM and PJMSettlement immediately if issuer of the unlimited Corporate Guaranty for Participant no longer has at least $1 million of total net worth or $5 million of total assets per Participant for which the issuer has issued an unlimited Corporate Guaranty.__________

   I certify that the issuer of the unlimited Corporate Guaranty to Participant continues to have at least $1 million of total net worth or $5 million of total assets per Participant for which the issuer has issued an unlimited Corporate Guaranty. I acknowledge that PJM and PJMSettlement are relying upon my certifications to maintain compliance with federal regulatory requirements.__________

c. I certify that Participant fulfills the eligibility requirements of the Commodity Futures Trading Commission exemption order (78 F.R. 19880 – April 2, 2013) by being in the business of at least one of the following in the PJM Region as indicated below (initial those applicable):

   1. Generating electric energy, including Participants that resell physical energy acquired from an entity generating electric energy:__________

   2. Transmitting electric energy:__________

   3. Distributing electric energy delivered under Point-to-Point or Network Integration Transmission Service, including scheduled import, export and wheel through transactions:__________

   4. Other electric energy services that are necessary to support the reliable operation of the transmission system:__________

      Description only if c(4) is initialed:

      ____

   Further, I certify that Participant will cease transacting in any PJM Markets and notify PJM and PJMSettlement immediately if Participant no longer performs at least one of the functions noted above in the PJM Region. I acknowledge that PJM and PJMSettlement are relying on my certification to maintain compliance with federal energy regulatory requirements.__________

d. I certify that Participant has provided a Letter of Credit of $5 million or more to PJM or PJMSettlement in a form acceptable to PJM and/or PJMSettlement as described in Tariff, Attachment Q, section V.B that the Participant acknowledges cannot be utilized to meet its credit requirements to PJM and PJMSettlement. I acknowledge that PJM and PJMSettlement are relying on the provision of this letter of credit and my certification to maintain compliance with federal regulatory requirements.__________

e. I certify that Participant has provided a surety bond of $5 million or more to PJM or PJMSettlement in a form acceptable to PJM and/or PJMSettlement as described in Tariff, Attachment Q, section V.D. that the Participant acknowledges cannot be utilized to meet its credit requirements to PJM and PJMSettlement. I acknowledge that PJM and PJMSettlement are relying on the provision of this surety bond and my certification to maintain compliance with federal regulatory requirements. __________

7. I acknowledge that I have read and understood the provisions of Tariff, Attachment Q applicable to Participant's business in any PJM Markets, including those provisions describing PJM’s Minimum Participation Requirements and the enforcement actions available to PJM and PJMSettlement of a Participant not satisfying those requirements. I acknowledge that the information provided herein is true and accurate to the best of my belief and knowledge after due investigation. In addition, by signing this certification, I acknowledge the potential consequences of making incomplete or false statements in this Certification.__________

Date: ____________________________ ____________________________________

Participant (Signature)

Print Name: ____________________________________

Title: ____________________________________

Attachment B

Revisions to the
PJM Open Access Transmission Tariff

(Clean Format)

ATTACHMENT Q

CREDIT RISK MANAGEMENT POLICY

I. INTRODUCTION

It is the policy of PJM that prior to an entity participating in any PJM Markets or in order to take Transmission Service, the entity must demonstrate its ability to meet the requirements in this Attachment Q. This Attachment Q also sets forth PJM's authority to deny, reject, or terminate a Participant's right to participate in any PJM Markets in order to protect the PJM Markets and PJM Members from unreasonable credit risk from any Participant's activities. Given the interconnectedness and overlapping of their responsibilities, PJM Interconnection, L.L.C. and PJM Settlement, Inc. are referred to both individually and collectively herein as "PJM."

PURPOSE

PJMSettlement is the counterparty to transactions in the PJM Markets. As a consequence, if a Participant defaults on its obligations under this Attachment Q, or PJM determines a Participant represents unreasonable credit risk to the PJM Markets, and the Participant does not post Collateral, additional Collateral or Restricted Collateral in response to a Collateral Call, the result is that the Participant represents unsecured credit risk to the PJM Markets. For this reason, PJM must have the authority to monitor and manage credit risk on an ongoing basis, and to act promptly to mitigate or reduce any unsecured credit risk, in order to protect the PJM Markets and PJM Members from losses.

This Attachment Q describes requirements for: (1) eligibility to be a Market Participant, (2) establishment and maintenance of credit by Market Participants, and (3) collateral requirements and forms of credit support that will be deemed as acceptable to mitigate risk to any PJM Markets.

This Attachment Q also sets forth (1) PJM's authority to monitor and manage credit risk that a Participant may represent to the PJM Markets and/or PJM membership in general, (2) the basis for establishing limits that will be imposed on a Market Participant in order to minimize risk, and (3) various obligations and requirements the violation of which will result in an Event of Default pursuant to this Attachment Q and the Agreements.

Attachment Q describes the types of data and information PJM will review in order to determine whether an Applicant or Market Participant presents an unreasonable risk to any PJM Markets and/or PJM membership in general, and the steps PJM may take in order to address that risk.

APPLICABILITY

This Attachment Q applies to all Applicants and Market Participants who take Transmission Service under this Tariff, or participate in any PJM Markets or market activities under the Agreements. Notwithstanding anything to the contrary in this Attachment Q, simply taking transmission service or procuring Ancillary Services via market-based rates does not imply market participation for purposes of applicability of this Attachment Q.

II. RISK EVALUATION PROCESS

PJM will conduct a risk evaluation to determine eligibility to become and/or remain a Market Participant or Guarantor that: (1) assesses the entity's financial strength, risk profile, creditworthiness, and other relevant factors; (2) determines an Unsecured Credit Allowance, if appropriate; (3) determines appropriate levels of Collateral; and (4) evaluates any Credit Support, including Guaranties or Letters of Credit.

A. Initial Risk Evaluation

PJM will perform an initial risk evaluation of each Applicant and/or its Guarantor. As part of the initial risk evaluation, PJM will consider certain Minimum Participation Requirements, assign an Internal Risk Score, establish an Unsecured Credit Allowance if appropriate, and make a determination regarding required levels of Collateral, creditworthiness, credit support, Restricted Collateral and other assurances for participation in certain PJM Markets.

Each Applicant and/or its Guarantor must provide the information set forth below at the time of its initial application pursuant to this Attachment Q and on an ongoing basis in order to remain eligible to participate in any PJM Markets. The same quantitative and qualitative factors will be used to evaluate Participants whether or not they have rated debt.

1. Rating Agency Reports

PJM will review Rating Agency reports from Standard & Poor's, Moody's Investors Service, Fitch Ratings, or other Nationally Recognized Statistical Rating Organization for each Applicant and/or Guarantor. The review will focus on the Applicant's or its Guarantor's senior unsecured debt ratings. If senior unsecured debt ratings are not available, PJM may consider other ratings, including issuer ratings, corporate ratings and/or an implied rating based on an internally derived Internal Credit Score pursuant to section II.A.3 below.

2. Financial Statements and Related Information

Each Applicant and/or its Guarantor must submit, or cause to be submitted, audited financial statements, except as otherwise indicated below, prepared in accordance with United States Generally Accepted Accounting Principles ("US GAAP") or any other format acceptable to PJM for the three (3) fiscal years most recently ended, or the period of existence of the Applicant and/or its Guarantor, if shorter. Applicants and/or their Guarantors must submit, or cause to be submitted, financial statements, which may be unaudited, for each completed fiscal quarter of the current fiscal year. All audited financial statements provided by the Applicant and/or its Guarantor must be audited by an Independent Auditor.

The information should include, but not be limited to, the following:

(a) If the Applicant and/or its Guarantor has publicly traded securities:

(i) Annual reports on Form 10-K, together with any amendments thereto;

(ii) Quarterly reports on Form 10-Q, together with any amendments thereto;

(iii) Form 8-K reports, if any, that have been filed since the most recent Form 10-K;

(iv) A summary provided by the Principal responsible, or to be responsible, for PJM Market activity of: (1) the Participant's primary purpose(s) of activity or anticipated activity in the PJM Markets (investment, trading or "hedging or mitigating commercial risks," as such phrase has meaning in the CFTC's regulations regarding the end-user exception to clearing); (2) the experience of the Participant (and its Principals) in managing risks in similar markets, including other organized RTO/ISO markets or on regulated commodity exchanges; and (3) a high level overview of the Participant's intended participation in the PJM Markets.

(v) All audited financial statements provided by an Applicant with publicly traded securities and/or its Guarantor with publicly traded securities must be audited by an Independent Auditor that satisfies the requirements set forth in the Sarbanes-Oxley Act of 2002.

(b) If the Applicant and/or its Guarantor does not have publicly-traded securities:

(i) Annual Audited Financial Statements or equivalent independently audited financials, and quarterly financial statements, generally found on:
- Balance Sheets
- Income Statements
- Statements of Cash Flows
- Statements of Stockholder's or Member's Equity or Net Worth;

(ii) Notes to Annual Audited Financial Statements, and notes to quarterly financial statements if any, including disclosures of any material changes from the last report;

(iii) Disclosure equivalent to a Management's Discussion & Analysis, including an executive overview of operating results and outlook, and compliance with debt covenants and indentures, and off balance sheet arrangements, if any;

(iv) Auditor's Report with an unqualified opinion or written letter from auditor containing the opinion whether the annual audited financial statements comply with the US GAAP or any other format acceptable to PJM; and

(v) A summary provided by the Principal responsible or to be responsible for PJM Market activity of: (1) the Participant's primary purpose(s) of activity or anticipated activity in the PJM Markets (investment, trading or "hedging or mitigating commercial risks," as such phrase has meaning in the CFTC's regulations regarding the end-user exception to clearing); (2) the experience of the Participant (and its Principals) in managing risks in similar markets, including other organized RTO/ISO markets or on regulated commodity exchanges; and (3) a high level overview of the Participant's intended participation in the PJM Markets.

(c) If Applicant and/or Guarantor is newly formed, does not yet have three (3) years of audited financials, or does not routinely prepare audited financial statements, PJM may specify other information to allow it to assess the entity's creditworthiness, including but not limited to:

(i) Equivalent financial information traditionally found in:
- Balance Sheets
- Income Statements
- Statements of Cash Flows

(ii) Disclosure equivalent to a Management's Discussion & Analysis, including an executive overview of operating results and outlook, and compliance with debt covenants and indentures, and off balance sheet arrangements, if any; and

(iii) A summary provided by the Principal responsible or to be responsible for PJM Market activity of: (1) the Participant's primary purpose(s) of activity or anticipated activity in the PJM Markets (investment, trading or "hedging or mitigating commercial risks," as such phrase has meaning in the CFTC's regulations regarding the end-user exception to clearing); (2) the experience of the Participant (and its Principals) in managing risks in similar markets, including other organized RTO/ISO markets or on regulated commodity exchanges; and (3) a high level overview of the Participant's intended participation in the PJM Markets.

(d) During a two year transition period from June 1, 2020 to May 31, 2022, the Applicant or Guarantor may provide a combination of audited financial statements and/or equivalent financial information.

If any of the above information in this section II.A.2 is available on the internet, the Applicant and/or its Guarantor may provide a letter stating where such statements can be located and retrieved by PJM. If an Applicant and/or its Guarantor files Form 10-K, Form 10-Q, or Form 8-K with the SEC, then the Applicant and/or its Guarantor will be deemed to have satisfied the requirement by indicating to PJM where the information in this section II.A.2 can be located on the internet.

If the Applicant and/or its Guarantor fails, for any reason, to provide the information required above in this section II.A.2, PJM has the right to (1) request Collateral and/or Restricted Collateral to cover the amount of risk reasonably associated with the Applicant and/or its Guarantor's expected activity in any PJM Markets, and/or (2) restrict the Applicant from participating in certain PJM Markets, including but not limited to restricting the positions the Applicant (once it becomes a Market Participant) takes in the market.

For certain Applicants and/or their Guarantors, some of the above submittals may not be applicable and alternate requirements for compliant submittals may be specified by PJM. In the credit evaluation of Municipalities and Cooperatives, PJM may also request additional information as part of the initial and ongoing review process and will consider other qualitative factors in determining financial strength and creditworthiness.

3. Credit Rating and Internal Credit Score

PJM will use credit risk scoring methodologies as a tool in determining an Unsecured Credit Allowance for each Applicant and/or its Guarantor. As its source for calculating the Unsecured Credit Allowance, PJM will rely on the ratings from a Rating Agency, if any, on the Applicant's or Guarantor's senior unsecured debt or their issuer ratings or corporate ratings if senior unsecured debt ratings are not available. If there is a split rating between the Rating Agencies, the lower of the ratings shall apply. If no external credit rating is available PJM will utilize its Internal Credit Score in order to calculate the Unsecured Credit Allowance.

The model used to develop the Internal Credit Score will be quantitative, based on financial data found in the income statement, balance sheet, and cash flow statement, and it will be qualitative based on relevant factors that may be internal or external to a particular Applicant and/or its Guarantor.

PJM will employ a framework, as outlined in Tables 1-5 below, based on metrics internal to the Applicant and/or its Guarantor, including capital and leverage, cash flow coverage of fixed obligations, liquidity, profitability, and other qualitative factors. The particular metrics and scoring rules differ according to the Applicant's or Guarantor's line of business and the PJM Markets in which it anticipates participating, in order to account for varying sources and degrees of risk to the PJM Markets and PJM members.

The formulation of each metric will be consistently applied to all Applicants and Guarantors across industries with slight variations based on identifiable differences in entity type, anticipated market activity, and risks to the PJM Markets and PJM members. In instances where the external credit rating is used to calculate the unsecured credit allowance, PJM may also use the Internal Credit Score as an input into determining the overall risk profile of an Applicant and/or its Guarantor.

Table 1. Quantitative Metrics by Line of Business: Leverage and Capital Structure	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
Debt / Total Capitalization (%)	■	■	■	■	▒	▒	■		■	■
FFO / Debt (%)	▒	▒	■	▒	■	■	▒		■	
Debt / EBITDA (x)	▒	▒	▒	▒	■	■	▒		■	
Debt / Property, Plant & Equipment (%)	▒	▒	▒	▒						
Retained Earnings / Total Assets (%)	■	■		■			■			
Debt / Avg Daily Production or KwH ($)	▒	▒	▒	▒			■			
Tangible Net Worth ($)						▒		■	▒	▒
Core Capital / Total Assets (%)								■		
Risk-Based Capital / RWA (%)								■		
Tier 1 Capital / RWA (%)								■		
Equity / Investments (%)										■
Debt / Investments (%)										■

■ primary metric ▒ secondary metric *FFO = Funds From Operations* *RWA = Risk-Weighted Asserts*

Table 2. Quantitative Metrics by Line of Business: Fixed Charge Coverage and Funding	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
EBIT / Interest Expense (x)	■	■	■	■	■	■	■		■	■
EBITDA / Interest Expense (x)	■	■	▒	■	■	■	■			
EBITDA / [Interest Exp + CPLTD] (x)	▒	▒	■	▒	▒	▒	▒			
[FFO + Interest Exp] / Interest Exp (x)	▒	▒	■	▒	▒	▒	▒			
Loans / Total Deposits (%)								■		
NPL / Gross Loans (%)								■		
NPL / [Net Worth + LLR] (%)								■		
Market Funding / Tangible Bank Assets (%)								■		

■ primary metric ▒ secondary metric *CPLTD = Current Portion of Long-Term Debt EBIT = Earnings Before Interest and Taxes EBITDA = Earnings Before Interest, Taxes, Depreciation and Amortization LLR = Loan Loss Reserves NPL = Non-Performing Loans*

Table 3. Quantitative Metrics by Line of Business: Liquidity	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
CFFO / Total Debt (x)										
Current Assets / Current Liabilities (x)										
Liquid Assets / Tangible Bank Assets (%)										
Sources / Uses of Funds (x)										
Weighted Avg Maturity of Debt (yrs)										
Floating Rate Debt / Total Debt (%)										

primary metric *secondary metric* *CFFO = Cash Flow From Operations*

Table 4. Quantitative Metrics by Line of Business: Profitability	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
Return on Assets (%)										
Return on Equity (%)										
Profit Volatility (%)										
Return on Revenue (%)										
Net Income / Tangible Assets (%)										
Net Profit ($)										
Net Income / Dividends (x)										

primary metric *secondary metric*

Table 5. Qualitative Factors: Industry Level	**Sample Reference Metrics**	**Investor-Owned Utilities**	**Municipal Utilities**	**Co-Operative Utilities**	**Power Transmission**	**Merchant Power**	**Project Developers**	**Exploration & Production**	**Financial Institutions**	**Commodity Trading**	**Private Equity**
Need for PJM Markets to Achieve Business Goals	Rating Agency criteria or other industry analysis	High	High	High	High	Med	Low	Med	Low	Low	N/A
Ability to Grow/Enter Markets other than PJM	Rating Agency criteria or other industry analysis	Very Low	Very Low	Very Low	Very Low	High	High	Med	Med	High	N/A

Other Participants' Ability to Serve Customers	Rating Agency criteria or other industry analysis	Low	Low	Low	Low	Low	Med	Low	Low	High	N/A
Regulation of Participant's Business	RRA regulatory climate scores, S&P BICRA	PUCS	Govt	N/A	FERC PUCs	N/A	N/A	N/A	N/A	N/A	N/A
Primary Purpose of PJM Activity	Investment ("Inv.")/ Trading ("Trade")/ Hedging or Mitigating Commercial Risk of Operations ("CRH")	CRH	CRH	CRH	CRH/ Trade	CRH/ Trade	CRH/ Trade	CRH/ Trade	Inv./ Trade	Inv./ Trade	Inv./ Trade

RRA = Regulatory Research Associates, a division of S&P Global, Inc. *BICRA = Bank Industry Country Risk Assessment*

The scores developed will range from 1-6, with the following mappings:

1 = Very Low Risk (S&P/Fitch: AAA to AA-; Moody's: Aaa to Aa3)
2 = Low Risk (S&P/Fitch: A+ to BBB+; Moody's: A1 to Baa1)
3 = Low to Medium Risk (S&P/Fitch: BBB; Moody's: Baa2)
4 = Medium Risk (S&P/Fitch: BBB-; Moody's: Baa3)
5 = Medium to High Risk (S&P/Fitch: BB+ to BB; Moody's Ba1 to Ba2)
6 = High Risk (S&P/Fitch: BB- and below; Moody's: Ba3 and below)

4. Trade References

If deemed necessary by PJM, whether because the Applicant is newly or recently formed or for any other reason, each Applicant and/or its Guarantor shall provide at least one (1) bank reference and three (3) Trade References to provide PJM with evidence of Applicant's understanding of the markets in which the Applicant is seeking to participate and the Applicant's experience and ability to manage risk. PJM may contact the bank references and Trade References provided by the Applicant to verify their business experience with the Applicant.

5. Litigation and Contingencies

Unless prohibited by law, each Applicant and Guarantor is also required to disclose and provide information as to the occurrence of, within the five (5) years prior to the submission of the information to PJM (i) any litigation, arbitration, investigation (formal inquiry initiated by a governmental or regulatory entity), or proceeding, pending or, to the knowledge of the involving, Applicant or its Guarantor or any of their Principals that would likely have a material adverse impact on its financial condition and/or would likely materially affect the risk of non-payment by the Applicant or Guarantor, or (ii) any finding of material defalcation, market manipulation or fraud by or involving the Applicant, Guarantor, or any of their Principals, predecessors, subsidiaries, or Credit Affiliates that participate in any United States power markets based upon a final adjudication of regulatory and/or legal proceedings, (iii) any bankruptcy declarations or petitions by or against an Applicant and/or Guarantor, or (iv) any violation by any of the foregoing of any federal or state regulations or laws regarding energy commodities, U.S. Commodity Futures Trading Commission ("CFTC") or FERC requirements, the rules of any exchange monitored by the National Futures Association, any self-regulatory organization or any other governing, regulatory, or standards body responsible for regulating activity in North American markets for electricity, natural gas or electricity-related commodity products. Each Applicant and Guarantor shall take reasonable measures to obtain permission to disclose information related to a non-public investigation. These disclosures shall be made by Applicant and Guarantor upon application, and within ten (10) Business Days of any material change with respect to any of the above matters.

6. History of Defaults in Energy Projects

Each Applicant and Guarantor shall disclose their current default status and default history for any energy related generation or transmission project (e.g. generation, solar, development), and within any wholesale or retail energy market, including but not limited to within PJM, any Independent System Operator or Regional Transmission Organization, and exchange that has not been cured within the past five (5) years. Defaults of a non-recourse project financed entity may not be included in the default history.

7. Other Disclosures and Additional Information

Each Applicant and Guarantor is required to disclose any Credit Affiliates that are currently Members of PJM, applying for membership with PJM, Transmission Customers, Participants, applying to become Market Participants, or that participate directly or indirectly in any PJM Markets or any other North American markets for electricity, natural gas or electricity-related commodity products. Each Applicant and Guarantor shall also provide a copy of its limited liability company agreement or equivalent agreement, certification of formation, articles of incorporation or other similar organization document, offering memo or equivalent, the names of its five (5) most senior Principals, and information pertaining to any non-compliance with debt covenants and indentures.
Applicants shall provide PJM the credit application referenced in section III.A and any other information or documentation reasonably required for PJM to perform the initial risk evaluation of Applicant's or Guarantor's creditworthiness and ability to comply with the requirements contained in the Agreements related to settlements, billing, credit requirements, and other financial matters.

B. Supplemental Risk Evaluation Process

As described in section VI below, PJM will conduct a supplemental risk evaluation process for Applicants, Participants, and Guarantors applying to conduct virtual and export transactions or participate in any PJM Markets.

C. Unsecured Credit Allowance

A Market Participant may request that PJM consider it for an Unsecured Credit Allowance pursuant to the provisions herein. Notwithstanding the foregoing, an FTR Participant shall not be considered for an Unsecured Credit Allowance for participation in the FTR markets.

1. Unsecured Credit Allowance Evaluation

PJM will perform a credit evaluation on each Participant that has requested an Unsecured Credit Allowance, both initially and at least annually thereafter. PJM shall determine the amount of Unsecured Credit Allowance, if any, that can be provided to the Market Participant in accordance with the creditworthiness and other requirements set forth in this Attachment Q. In completing the credit evaluation, PJM will consider:

(a) Rating Agency Reports

PJM will review Rating Agency reports as for each Market Participant on the same basis as described in section II.A.1 above and section II.E.1 below.

(b) Financial Statements and Related Information

All financial statements and related information considered for an Unsecured Credit Allowance must satisfy all of the same requirements described in section II.A.2 above and section II.E.2 below.

2. Material Adverse Changes

Each Market Participant is responsible for informing PJM, in writing, of any Material Adverse Change in its financial condition (or the financial condition of its Guarantor) since the date of the Market Participant or Guarantor's most recent annual financial statements provided to PJM, pursuant to the requirements reflected in section II.A.2 above and section II.E.3 below.

In the event that PJM determines that a Material Adverse Change in the financial condition of a Market Participant warrants a requirement to provide Collateral, additional Collateral or Restricted Collateral, PJM shall comply with the process and requirements described in section II.A above and section II.E below.

3. Other Disclosures

Each Market Participant desiring an Unsecured Credit Allowance is required to make the disclosures and upon the same requirements reflected in section II.A.7 above and section II.E.7 below.

D. Determination of Unreasonable Credit Risk

Unreasonable credit risk shall be determined by the likelihood that an Applicant will default on a financial obligation arising from its participation in any PJM Markets. Indicators of potentially unreasonable credit risk include, but are not limited to, a history of market manipulation based upon a final adjudication of regulatory and/or legal proceedings, a history of financial defaults, a history of bankruptcy or insolvency within the past five (5) years, or a combination of current market and financial risk factors such as low capitalization, a reasonably likely future material financial liability, a low Internal Credit Score (derived pursuant to section II.A.3 above) and/or a low externally derived credit score. PJM's determination will be based on, but not limited to, information and material provided to PJM during its initial risk evaluation process, information and material provided to PJM in the Officer's Certification, and/or information gleaned by PJM from public and non-public sources.

If PJM determines that an Applicant poses an unreasonable credit risk to the PJM Markets, PJM may require Collateral, additional Collateral, or Restricted Collateral commensurate with the Applicant's risk of financial default, reject an application, and/or limit or deny Applicant's participation in the PJM Markets, to the extent and for the time period it determines is necessary to mitigate the unreasonable credit risk to the PJM Markets. PJM will reject an application if it determines that Collateral, additional Collateral, or Restricted Collateral cannot address the risk.

PJM will communicate its concerns regarding whether the Applicant presents an unreasonable credit risk, if any, in writing to the Applicant and attempt to better understand the circumstances surrounding that Applicant's financial and credit position before making its determination. In the event PJM determines that an Applicant presents an unreasonable credit risk that warrants a requirement to provide Collateral of any type, or some action to mitigate risk, PJM shall provide the Applicant with a written explanation of why such determination was made.

E. Ongoing Risk Evaluation

In addition to the initial risk evaluation set forth in sections II.A through II.D above and the annual certification requirements set forth in section III.A below, each Market Participant and/or its Guarantor has an ongoing obligation to provide PJM with the information required in section IV.A described in more detail below. PJM may also review public information regarding a Market Participant and/or its Guarantor as part of its ongoing risk evaluation. If appropriate, PJM will revise the Market Participant's Unsecured Credit Allowance and/or change its determination of creditworthiness, credit support, Restricted Collateral, required Collateral or other assurances pursuant to PJM's ongoing risk evaluation process.

Each Market Participant and/or its Guarantor must provide the information set forth below on an ongoing basis in order to remain eligible to participate in any PJM Markets. The same quantitative and qualitative factors will be used to evaluate Market Participants whether or not they have rated debt.

1. Rating Agency Reports

PJM will review Rating Agency reports for each Market Participant and/or Guarantor on the same basis as described in section II.A.1 above.

2. Financial Statements and Related Information

On an ongoing basis, Market Participants and/or their Guarantors shall provide the information they are required to provide as described in section II.A.2 above, pursuant to the schedule reflected below, with one exception. With regard to the summary that is required to be provided by the Principal responsible for PJM Market activity, with respect to experience of the Participant or its Principals in managing risks in similar markets, the Principal only needs to provide that information for a new Principal that was not serving in the position when the prior summary was provided. PJM will review financial statements and related information for each Market Participant and/or Guarantor on the same basis as described in section II.A.2 above.

Each Market Participant and/or its Guarantor must submit, or cause to be submitted, annual audited financial statements, except as otherwise indicated below, prepared in accordance with US GAAP or any other format acceptable to PJM for the fiscal year most recently ended within ten (10) calendar days of the financial statements becoming available and no later than one hundred twenty (120) calendar days after its fiscal year end. Market Participants and/or their Guarantors must submit, or cause to be submitted, financial statements, which may be unaudited, for each completed fiscal quarter of the current fiscal year, promptly upon their issuance, but no later than sixty (60) calendar days after the end of each fiscal quarter. All audited financial statements provided by the Market Participant and/or its Guarantor must be audited by an Independent Auditor.

Notwithstanding the foregoing, PJM may upon request, grant a Market Participant or Guarantor an extension of time, if the financials are not available within the time frame stated above.

3. Material Adverse Changes

Each Market Participant and each Guarantor is responsible for informing PJM, in writing, of any Material Adverse Change in its or its Guarantor's financial condition within five (5) Business Days of any Principal becoming aware of the occurrence of a Material Adverse Change since the date of the Market Participant or Guarantor's most recent annual financial statements provided to PJM. However, PJM may also independently establish from available information that a Participant and/or its Guarantor has experienced a Material Adverse Change in its financial condition without regard to whether such Market Participant or Guarantor has informed PJM of the same.

For the purposes of this Attachment Q, a Material Adverse Change in financial condition may include, but is not be limited to, any of the following:

(a) a bankruptcy filing;
(b) insolvency;
(c) a significant decrease in market capitalization;
(d) restatement of prior financial statements unless required due to regulatory changes;
(e) the resignation or removal of a Principal unless there is a new Principal appointed or expected to be appointed, a transition plan in place pending the appointment of a new Principal, or a planned restructuring of such roles;

(f) the filing of a lawsuit or initiation of an arbitration, investigation, or other proceeding that would likely have a material adverse effect on any current or future financial results or financial condition or increase the likelihood of non-payment;

(g) a material financial default in any other organized energy, ancillary service, financial transmission rights and/or capacity markets including but not limited to those of another Regional Transmission Organization or Independent System Operator, or on any commodity exchange, futures exchange or clearing house, that has not been cured or remedied after any required notice has been given and any cure period has elapsed;

(h) a revocation of a license or other authority by any Federal or State regulatory agency; where such license or authority is necessary or important to the Participant's continued business, for example, FERC market-based rate authority, or State license to serve retail load;

(i) a significant change in credit default swap spreads, market capitalization, or other market-based risk measurement criteria, such as a recent increase in Moody's KMV Expected Default Frequency (EDF^{tm}) that is materially greater than the increase in its peers' EDF^{tm} rates, or a collateral default swap (CDS) premium normally associated with an entity rated lower than investment grade;

(j) a confirmed, undisputed material financial default in a bilateral arrangement with another Participant or counterparty that has not been cured or remedied after any required notice has been given and any cure period has elapsed;

(k) the sale by a Participant of all or substantially all of its bilateral position(s) in the PJM Markets;

(l) any adverse changes in financial condition which, individually, or in the aggregate, are material; and,

(m) any adverse changes, events or occurrences which, individually or in the aggregate, could affect the ability of the entity to pay its debts as they become due or could reasonably be expected to have a material adverse effect on any current or future financial results or financial condition.

Upon identification of a Material Adverse Change, PJM shall evaluate the financial strength and risk profile of the Market Participant and/or its Guarantor at that time and may do so on a more frequent basis going forward. If the result of such evaluation identifies unreasonable credit risk to any PJM Market as further described in section II.E.8 below, PJM will take steps to mitigate the financial exposure to the PJM Markets. These steps include, but are not limited to requiring the Market Participant and/or each Guarantor to provide Collateral, additional Collateral or additional Restricted Collateral that is commensurate with the amount of risk in which the Market Participant wants to engage, and/or limiting the Market Participant's ability to participate in any PJM Market to the extent, and for the time-period necessary to mitigate the unreasonable credit risk. In the event PJM determines that a Material Adverse Change in the financial condition or risk profile of a Market Participant and/or Guarantor, warrants a requirement to provide Collateral of any type, or some action to mitigate risk, PJM shall provide the Market Participant and/or Guarantor, a written explanation of why such determination was made. Conversely, in the event PJM determines there has been an improvement in the financial condition or risk profile of a Market Participant and/or Guarantor such that the amount of

Collateral needed for that Market Participant and/or Guarantor can be reduced, PJM shall provide a written explanation why such determination was made, including the amount of the Collateral reduction and indicating when and how the reduction will be made.

4. Litigation and Contingencies

Each Market Participant and/or Guarantor is required to disclose and provide information regarding litigation and contingencies as outlined in section II.A.5 above.

5. History of Defaults in Energy Projects

Each Market Participant and/or Guarantor is required to disclose current default status and default history as outlined in section II.A.6 above.

6. Internal Credit Score

As part of its ongoing risk evaluation, PJM will use credit risk scoring methodologies as a tool in determining an Internal Credit Score for each Market Participant and/or Guarantor, utilizing the same model and framework outlined in section II.A.3 above.

7. Other Disclosures and Additional Information

Each Market Participant and/or Guarantor is required to make other disclosures and provide additional information outlined in section II.A.7 above.

PJM will monitor each Market Participant's use of services and associated financial obligations on a regular basis to determine their total potential financial exposure and for credit monitoring purposes, and may require the Market Participant and/or Guarantor to provide additional information, pursuant to the terms and provisions described herein.

Market Participants shall provide PJM, upon request, any information or documentation reasonably required for PJM to monitor and evaluate a Market Participant's creditworthiness and compliance with the Agreements related to settlements, billing, credit requirements, and other financial matters.

8. Unreasonable Credit Risk

If PJM has reasonable grounds to believe that a Market Participant and/or its Guarantor poses an unreasonable credit risk to any PJM Markets, PJM may immediately notify the Market Participant of such unreasonable credit risk and (1) issue a Collateral Call to demand Collateral, additional Collateral, or Restricted Collateral or other assurances commensurate with the Market Participant's and/or its Guarantor's risk of financial default or other risk posed by the Market Participant's or Guarantor's financial condition or risk profile to the PJM Markets and PJM members, or (2) limit or suspend the Market Participant's participation in any PJM Markets, to the extent and for such time period PJM determines is necessary to mitigate the unreasonable credit risk to any PJM Markets. PJM will only limit or suspend a Market Participant's market participation if Collateral, additional Collateral or Restricted Collateral cannot address the unreasonable credit risk.

PJM's determination will be based on, but not limited to, information and material provided to PJM during its ongoing risk evaluation process or in the Officer's Certification, and/or information gleaned by PJM from public and non-public sources. PJM will communicate its concerns, if any, in writing to the Market Participant and attempt to better understand the circumstances surrounding the Market Participant's financial and credit position before making its determination. At PJM's request or upon its own initiative, the Market Participant or its Guarantor may provide supplemental information to PJM that would allow PJM to consider reducing the additional Collateral requested or reducing the severity of limitations or other restrictions designed to mitigate the Market Participant's credit risk. Such information shall include, but not be limited to: (i) the Market Participant's estimated exposure, (ii) explanations for any recent change in the Market Participant's market activity, (iii) any relevant new load or unit outage information; or (iv) any default or supply contract expiration, termination or suspension.

The Market Participant shall have five (5) Business Days to respond to PJM's request for supplemental information. If the requested information is provided in full to PJM's satisfaction during said period, the additional Collateral requirement shall reflect the Market Participant's anticipated exposure based on the information provided. Notwithstanding the foregoing, any additional Collateral requested by PJM in a Collateral Call must be provided by the Market Participant within the applicable cure period.

In the event PJM determines that an Market Participant and/or its Guarantor presents an unreasonable credit risk, as described above, that warrants a requirement to provide Collateral of any type, or some action to mitigate risk, PJM shall provide the Market Participant with a written explanation of why such final determination was made.

PJM has the right at any time to modify any Unsecured Credit Allowance and/or require additional Collateral as may be deemed reasonably necessary to support current or anticipated market activity as set forth in Tariff, Attachment Q, sections II.A.2 and II.C.1.b. Failure to remit the required amount of additional Collateral within the applicable cure period shall constitute an Event of Default.

F. Collateral and Credit Restrictions

PJM may establish certain restrictions on available credit by requiring that some amounts of credit, i.e. Restricted Collateral, may not be available to satisfy credit requirements. Such designations shall be construed to be applicable to the calculation of credit requirements only, and shall not restrict PJM's ability to apply such designated credit to any obligation(s) in case of a default. Any such Restricted Collateral will be held by PJM, as applicable. Such Restricted Collateral will not be returned to the Participant until PJM has determined that the risk for which such Restricted Collateral is being held has subsided or been resolved.

PJM may post on PJM's web site, and may reference on OASIS, a supplementary document which contains additional business practices (such as algorithms for credit scoring) that are not included in this Attachment Q. Changes to the supplementary document will be subject to stakeholder review and comment prior to implementation. PJM may specify a required compliance date, not less than fifteen (15) calendar days from notification, by which time all Participants and their Guarantors must comply with provisions that have been revised in the supplementary document.

PJM will regularly post each Participant's and/or its Guarantor's credit requirements and credit provisions on the PJM web site in a secure, password-protected location. Each Participant and/or its Guarantor is responsible for monitoring such information, and maintaining sufficient credit to satisfy the credit requirements described herein. Failure to maintain credit sufficient to satisfy the credit requirements of the Attachment Q shall constitute a Credit Breach, and the Participant will be subject to the remedies established herein and in any of the Agreements.

G. Unsecured Credit Allowance Calculation

The external rating from a Rating Agency will be used as the source for calculating the Unsecured Credit Allowance, unless no external credit rating is available in which case PJM will utilize its Internal Credit Score for such purposes. If there is a split rating between the Rating Agencies, the lower of the ratings shall apply.

Where two or more entities, including Participants, are considered Credit Affiliates, Unsecured Credit Allowances will be established for each individual Participant, subject to an aggregate maximum amount for all Credit Affiliates as provided for in Attachment Q, section II.G.3.

In its credit evaluation of Municipalities and Cooperatives, PJM may request additional information as part of the ongoing risk evaluation process and will also consider qualitative factors in determining financial strength and creditworthiness.

1. Credit Rating and Internal Credit Score

As previously described in section II.A.3 above, PJM will determine the Internal Credit Score for an Applicant, Market Participant and/or its Guarantor using the credit risk scoring methodologies contained therein. Internal Credit Scores, ranging from 1-6, for each Applicant, Market Participant and/or its Guarantor, will be determined with the following mappings:

1 = Very Low Risk (S&P/Fitch: AAA to AA-; Moody's: Aaa to Aa3)
2 = Low Risk (S&P/Fitch: A+ to BBB+; Moody's: A1 to Baa1)
3 = Low to Medium Risk (S&P/Fitch: BBB; Moody's: Baa2)
4 = Medium Risk (S&P/Fitch: BBB-; Moody's: Baa3)
5 = Medium to High Risk (S&P/Fitch: BB+ to BB; Moody's Ba1 to Ba2)
6 = High Risk (S&P/Fitch: BB- and below; Moody's: Ba3 and below)

In instances where the external credit rating is used to calculate the unsecured credit allowance, PJM may also use the Internal Credit Score as an input into its determination of the overall risk profile of an Applicant and/or its Guarantor

2. Unsecured Credit Allowance

PJM will determine a Participant's Unsecured Credit Allowance based on its external rating or its Internal Credit Score, as applicable, and the parameters in the table below. The maximum Unsecured Credit Allowance is the lower of:

(a) A percentage of the Participant's Tangible Net Worth, as stated in the table below, with the percentage based on the Participant's external rating or Internal Credit Score, as applicable; and

(b) A dollar cap based on the external rating or Internal Credit Score, as applicable, as stated in the table below:

Internal Credit Score	**Risk Ranking**	**Tangible Net Worth Factor**	**Maximum Unsecured Credit Allowance ($ Million)**
1.00 – 1.99	1 – Very Low (AAA to AA-)	Up to 10.00%	$50
2.00 – 2.99	2 – Low (A+ to BBB+)	Up to 8.00%	$42
3.00 – 3.49	3 – Low to Medium (BBB)	Up to 6.00%	$33
3.50 – 4.49	4 – Medium (BBB-)	Up to 5.00%	$7
4.50 – 5.49	5 – Medium to High (BB+ to BB)	0%	$0
> 5.49	6 – High (BB- and below)	0%	$0

If a Corporate Guaranty is utilized to establish an Unsecured Credit Allowance for a Participant, the value of a Corporate Guaranty will be the lesser of:

(a) The limit imposed in the Corporate Guaranty;

(b) The Unsecured Credit Allowance calculated for the Guarantor; and

(c) A portion of the Unsecured Credit Allowance calculated for the Guarantor in the case of Credit Affiliates.

PJM has the right at any time to modify any Unsecured Credit Allowance and/or require additional Collateral as may be deemed reasonably necessary to support current market activity.

Failure to remit the required amount of additional Collateral within the applicable cure period shall be deemed an Event of Default.

PJM will maintain a posting of each Participant's Unsecured Credit Allowance, along with certain other credit related parameters, on the PJM website in a secure, password-protected location. Each Participant will be responsible for monitoring such information and recognizing changes that may occur.

3. Unsecured Credit Limits For Credit Affiliates

If two or more Participants are Credit Affiliates and have requested an Unsecured Credit Allowance, PJM will consider the overall creditworthiness of the Credit Affiliates when determining the Unsecured Credit Allowances in order not to establish more Unsecured Credit for the Credit Affiliates collectively than the overall corporate family could support.

> **Example:** Participants A and B each have a $10.0 million Corporate Guaranty from their common parent, a holding company with an Unsecured Credit Allowance calculation of $12.0 million. PJM may limit the Unsecured Credit Allowance for each Participant to $6.0 million, so the total Unsecured Credit Allowance does not exceed the corporate family total of $12.0 million.

PJM will work with the Credit Affiliates to allocate the total Unsecured Credit Allowance among the Credit Affiliates while assuring that no individual Participant, nor common guarantor, exceeds the Unsecured Credit Allowance appropriate for its credit strength. The aggregate Unsecured Credit for a Participant, including Unsecured Credit Allowance granted based on its own creditworthiness and risk profile, and any Unsecured Credit Allowance conveyed through a Guaranty shall not exceed $50 million. The aggregate Unsecured Credit for a Credit Affiliate~~s~~ corporate family shall not exceed $50 million. A Credit Affiliate corporate family subject to this cap shall request PJM to allocate the maximum Unsecured Credit amongst the corporate family, assuring that no individual Participant or common guarantor, shall exceed the Unsecured Credit level appropriate for its credit strength and activity.

H. Contesting an Unsecured Credit Evaluation

PJM will provide to a Participant, upon request, a written explanation for any determination of or change in Unsecured Credit or credit requirement within ten (10) Business Days of receiving such request.

If a Participant believes that either its level of Unsecured Credit or its credit requirement has been incorrectly determined, according to this Attachment Q, then the Participant may send a request for reconsideration in writing to PJM. Such a request should include:

(1) A citation to the applicable section(s) of this Attachment Q along with an explanation of how the respective provisions of this Attachment Q were not carried out in the determination as made; and

(2) A calculation of what the Participant believes should be the appropriate Unsecured Credit or Collateral requirement, according to terms of this Attachment Q.

PJM will provide a written response as promptly as practical, but no more than ten (10) Business Days after receipt of the request. If the Participant still feels that the determination is incorrect, then the Participant may contest that determination. Such contest should be in written form, addressed to PJM, and should contain:

(1) A complete copy of the Participant’s earlier request for reconsideration, including citations and calculations;

(2) A copy of PJM’s written response to its request for reconsideration; and

(3) An explanation of why it believes that the determination still does not comply with this Attachment Q.

PJM will investigate and will respond to the Participant with a final determination on the matter as promptly as practical, but no more than twenty (20) Business Days after receipt of the request.

Neither requesting reconsideration nor contesting the determination following such request shall relieve or delay Participant's responsibility to comply with all provisions of this Attachment Q, including without limitation posting Collateral, additional Collateral or Restricted Collateral in response to a Collateral Call.

If a Corporate Guaranty is being utilized to establish credit for a Participant, the Guarantor will be evaluated and the Unsecured Credit Allowance granted, if any, based on the financial strength and creditworthiness, and risk profile of the Guarantor. Any utilization of a Corporate Guaranty will only be applicable to non-FTR credit requirements, and will not be applicable to cover FTR credit requirements.

PJM will identify any necessary Collateral requirements and establish a Working Credit Limit for each Participant. Any Unsecured Credit Allowance will only be applicable to non-FTR credit requirements, for positions in PJM Markets other than the FTR market, because all FTR credit requirements must be satisfied by posting Collateral.

III. MINIMUM PARTICIPATION REQUIREMENTS

A Participant seeking to participate in any PJM Markets shall submit to PJM any information or documentation reasonably required for PJM to evaluate its experience and resources. If PJM determines, based on its review of the relevant information and after consultation with the Participant, that the Participant’s participation in any PJM Markets presents an unreasonable credit risk, PJM may reject the Participant’s application to become a Market Participant, notwithstanding applicant’s ability to meet other minimum participation criteria, registration requirements and creditworthiness requirements.

A. Annual Certification

Before they are eligible to transact in any PJM Market, all Applicants shall provide to PJM (i) an executed copy of a credit application and (ii) a copy of the annual certification set forth in Attachment Q, Appendix 1. As a condition to continued eligibility to transact in any PJM Market, Market Participants shall provide to PJM the annual certification set forth in Attachment Q, Appendix 1.

After the initial submission, the annual certification must be submitted each calendar year by all Market Participants between January 1 and April 30. PJM will accept such certifications as a matter of course and the Market Participants will not need further notice from PJM before commencing or maintaining their eligibility to participate in any PJM Markets.

A Market Participant that fails to provide its annual certification by April 30 shall be ineligible to transact in any PJM Markets and PJM will disable the Market Participant's access to any PJM Markets until such time as PJM receives the certification. In addition, failure to provide an executed annual certification in a form acceptable to PJM and by the specified deadlines may result in a default under the Tariff.

Market Participants acknowledge and understand that the annual certification constitutes a representation upon which PJM will rely. Such representation is additionally made under the Tariff, filed with and accepted by FERC, and any false, misleading or incomplete statement knowingly made by the Market Participant and that is material to the Market Participant's ability to perform may be considered a violation of the Tariff and subject the Market Participant to action by FERC. Failure to comply with any of the criteria or requirements listed herein or in the certification may result in suspension or limitation of a Market Participant's transaction rights in any PJM Markets.

Applicants and Market Participants shall submit to PJM, upon request, any information or documentation reasonably and/or legally required to confirm Applicant's or Market Participant's compliance with the Agreements and the annual certification.

B. PJM Market Participation Eligibility Requirements

PJM may conduct periodic verification to confirm that Applicants and Market Participants can demonstrate that they meet the definition of "appropriate person" to further ensure minimum criteria are in place. Such demonstration will consist of the submission of evidence and an executed Annual Officer Certification form as set forth in Attachment Q, Appendix 1 in a form acceptable to PJM. If an Applicant or Market Participant does not provide sufficient evidence for verification to PJM within five (5) Business Days of written request, then such Applicant or Market Participant may result in a default under this Tariff. Demonstration of "appropriate person" status and support of other certifications on the annual certification is one part of the Minimum Participation Requirements for any PJM Markets and does not obviate the need to meet the other Minimum Participation Requirements such as those for minimum capitalization and risk profile as set forth in this Attachment Q.

To be eligible to transact in any PJM Markets, an Applicant or Participant must demonstrate in accordance with the Risk Management and Verification processes set forth below that it qualifies in one of the following ways:

1. an "appropriate person," as that term is defined under Commodity Exchange Act, section 4(c)(3), or successor provision, or;

2. an "eligible contract participant," as that term is defined in Commodity Exchange Act, section 1a(18), or successor provision, or;

3. a business entity or person who is in the business of: (1) generating, transmitting, or distributing electric energy, or (2) providing electric energy services that are necessary to support the reliable operation of the transmission system, or;

4. an Applicant or Market Participant seeking eligibility as an "appropriate person" providing an unlimited Corporate Guaranty in a form acceptable to PJM as described in section V below from a Guarantor that has demonstrated it is an "appropriate person," and has at least $1 million of total net worth or $5 million of total assets per Applicant and Market Participant for which the Guarantor has issued an unlimited Corporate Guaranty, or;

5. an Applicant or Market Participant providing a Letter of Credit of at least $5 million to PJM in a form acceptable to PJM as described in section V below, that the Applicant or Market Participant acknowledges is separate from, and cannot be applied to meet, its credit requirements to PJM, or;

6. an Applicant or Market Participant providing a surety bond of at least $5 million to PJM in a form acceptable to PJM as described in section V below, that the Applicant or Market Participant acknowledges is separate from, and cannot be applied to meet, its credit requirements to PJM.

If, at any time, a Market Participant cannot meet the eligibility requirements set forth above, it shall immediately notify PJM and immediately cease conducting transactions in any PJM Markets. PJM may terminate a Market Participant's transaction rights in any PJM Markets if, at any time, it becomes aware that the Market Participant does not meet the minimum eligibility requirements set forth above.

In the event that a Market Participant is no longer able to demonstrate it meets the minimum eligibility requirements set forth above, and possesses, obtains or has rights to possess or obtain, any open or forward positions in any PJM Markets, PJM may take any such action it deems necessary with respect to such open or forward positions, including, but not limited to, liquidation, transfer, assignment or sale; provided, however, that the Market Participant will, notwithstanding its ineligibility to participate in any PJM Markets, be entitled to any positive market value of those positions, net of any obligations due and owing to PJM.

C. Risk Management and Verification

All Market Participants must maintain current written risk management policies, procedures, or controls to address how market and credit risk is managed, and are required to submit to PJM (at the time they make their annual certification) a copy of their current governing risk control policies, procedures and controls applicable to their market activities. PJM will review such documentation to verify that it appears generally to conform to prudent risk management practices for entities participating in any PJM Markets.

All Market Participants subject to this provision shall make a one-time payment of $1,500.00 to PJM to cover administrative costs. Thereafter, if such Participant's risk policies, procedures and controls applicable to its market activities change substantively, it shall submit such modified documentation, with applicable administrative charge determined by PJM, to PJM for review and verification at the time it makes its annual certification. All Market Participant's continued eligibility to participate in any PJM Markets is conditioned on PJM notifying a Participant that its annual certification, including the submission of its risk policies, procedures and controls, has been accepted by PJM. PJM may retain outside expertise to perform the review and verification function described in this section, however, in all circumstances, PJM and any third-party it may retain will treat as confidential the documentation provided by a Participant under this section, consistent with the applicable provisions of the Operating Agreement.

Participants must demonstrate that they have implemented prudent risk management policies and procedures in order to be eligible to participate in any PJM Markets. Participants must demonstrate on at least an annual basis that they have implemented and maintained prudent risk management policies and procedures in order to continue to participate in any PJM Markets. Upon written request, the Participant will have fourteen (14) calendar days to provide to PJM current governing risk management policies, procedures, or controls applicable to Participant's activities in any PJM Markets.

D. Capitalization

In advance of certification, Applicants shall meet the minimum capitalization requirements below. In addition to the annual certification requirements in Attachment Q, Appendix 1, a Market Participant shall satisfy the minimum capitalization requirements on an annual basis thereafter. A Participant must demonstrate that it meets the minimum financial requirements appropriate for the PJM Markets in which it transacts by satisfying either the minimum capitalization or the provision of Collateral requirements listed below:

1. Minimum Capitalization

Minimum capitalization may be met by demonstrating minimum levels of Tangible Net Worth or tangible assets. FTR Participants must demonstrate a Tangible Net Worth in excess of $1 million or tangible assets in excess of $10 million. Other Market Participants must demonstrate a Tangible Net Worth in excess of $500,000 or tangible assets in excess of $5 million.

(a) Consideration of tangible assets and Tangible Net Worth shall exclude assets which PJM reasonably believes to be restricted, highly risky, or potentially unavailable to settle a claim in the event of default. Examples include, but are not limited to, restricted assets, derivative assets, goodwill, and other intangible assets.

(b) Demonstration of "tangible" assets and Tangible Net Worth may be satisfied through presentation of an acceptable Corporate Guaranty, provided that both:

(i) the Guarantor is a Credit Affiliate company that satisfies the Tangible Net Worth or tangible assets requirements herein, and;

(ii) the Corporate Guaranty is either unlimited or at least $500,000.

If the Corporate Guaranty presented by the Participant to satisfy these capitalization requirements is limited in value, then the Participant's resulting Unsecured Credit Allowance shall be the lesser of:

(1) the applicable Unsecured Credit Allowance available to the Participant by the Corporate Guaranty pursuant to the creditworthiness provisions of this Attachment Q, or,

(2) the face value of the Corporate Guaranty, reduced by $500,000 and further reduced by 10%. (For example, a $10.5 million Corporate Guaranty would be reduced first by $500,000 to $10 million and then further reduced 10% more to $9 million. The resulting $9 million would be the Participant's Unsecured Credit Allowance available through the Corporate Guaranty).

In the event that a Participant provides Collateral in addition to a limited Corporate Guaranty to increase its available credit, the value of such Collateral shall be reduced by 10%. This reduced value shall be considered the amount available to satisfy requirements of this Attachment Q.

(c) Demonstrations of minimum capitalization (minimum Tangible Net Worth or tangible assets) must be presented in the form of audited financial statements for the Participant's most recent fiscal year during the initial risk evaluation process and ongoing risk evaluation process.

2. Provision of Collateral

If a Participant does not demonstrate compliance with its applicable minimum capitalization requirements above, it may still qualify to participate in any PJM Markets by posting Collateral, additional Collateral, and/or Restricted Collateral, subject to the terms and conditions set forth herein.

Any Collateral provided by a Participant unable to satisfy the minimum capitalization requirements above will also be restricted in the following manner:

(a) Collateral provided by Market Participants that engage in FTR transactions shall be reduced by an amount of the current risk plus any future risk to any PJM Markets and PJM membership in general, and may coincide with limitations on market participation. The amount of this Restricted Collateral shall not be available to cover any credit requirements from market activity. The remaining value shall be considered the amount available to satisfy requirements of this Attachment Q.

(b) Collateral provided by other Participants that engage in Virtual Transactions or Export Transactions shall be reduced by $200,000 and then further reduced by 10%. The amount of this Restricted Collateral shall not be available to cover any credit requirements from market activity. The remaining value shall be considered the amount available to satisfy requirements of this Attachment Q.

(c) Collateral provided by other Participants that do not engage in Virtual Transactions or Export Transactions shall be reduced by 10%. The amount of this Restricted Collateral shall not be available to cover any credit requirements from market activity. The remaining value shall be considered the amount available to satisfy requirements of this Attachment Q.

In the event a Participant that satisfies the minimum capital requirement through provision of Collateral also provides a Corporate Guaranty to increase its available credit, then the Participant's resulting Unsecured Credit Allowance conveyed through such Corporate Guaranty shall be the lesser of:

(a) the applicable Unsecured Credit Allowance available to the Participant by the Corporate Guaranty pursuant to the creditworthiness provisions of this Attachment Q; or

(b) the face value of the Corporate Guaranty, reduced commensurate with the amount of the current risk plus any anticipated future risk to any PJM Markets and PJM membership in general, and may coincide with limitations on market participation.

IV. ONGOING COVENANTS

A. Ongoing Obligation to Provide Information to PJM

So long as a Participant is eligible to participate, or participates or holds positions, in any PJM Markets, it shall deliver to PJM, in form and detail satisfactory to PJM:

(1) All financial statements and other financial disclosures as required by section II.E.2 by the deadline set forth therein;

(2) Notice, within five (5) Business Days, of any Principal becoming aware that the Participant does not meet the Minimum Participation Requirements set forth in section III;

(3) Notice when any Principal becomes aware of any matter that has resulted or would reasonably be expected to result in a Material Adverse Change in the financial condition of the Participant or its Guarantor, if any, a description of such Material Adverse Change in detail reasonable to allow PJM to determine its potential effect on, or any change in, the Participant's risk profile as a participant in any PJM Markets, by the deadline set forth in section II.E.3 above;

(4) Notice, within the deadline set forth therein, of any Principal becoming aware of a litigation or contingency event described in section II.E.4, or of a Material Adverse Change in any such litigation or contingency event previously disclosed to PJM, information in detail reasonable to allow PJM to determine its potential effect on, or any change in, the Market Participant's risk profile as a participant in any PJM Markets by the deadline set forth therein;

(5) Notice, within two (2) Business Days after any Principal becomes aware of a Credit Breach, Financial Default, or Credit Support Default, that includes a description of such default or event and the Participant's proposals for addressing the default or event;

(6) As soon as available but not later than April 30th of any calendar year, the annual Certification described in section III.A in a form set forth in Attachment Q, Appendix 1;

(7) Concurrently with submission of the annual certification, demonstration that the Participant meets the minimum capitalization requirements set forth in section III.D;

(8) Concurrently with submission of the annual certification and within the applicable deadline of any substantive change, or within the applicable deadline of a request from PJM, a copy of the Participant's written risk management policies, procedures or controls addressing how the Participant manages market and credit risk in the PJM Markets in which it participates, as well as a high level summary by the chief risk officer or other Principal regarding any material violations, breaches, or compliance or disciplinary actions related to the risk management policies, by the Participant under the policies, procedures or controls within the prior 12 months, as set forth in section IV.B below;

(9) Within five (5) Business Days of request by PJM, evidence demonstrating the Participant meets the definition of "appropriate person" or "eligible contract participant," as those terms are defined in the Commodity Exchange Act and the CFTC regulations promulgated thereunder, or of any other certification in the annual Certification; or

(10) Within a reasonable time after PJM requests, any other information or documentation reasonably and/or legally required by PJM to confirm Participant's compliance with the Tariff and its eligibility to participate in any PJM Markets.

Participants acknowledge and understand that the deliveries constitute representations upon which PJM will rely in allowing the Participant to continue to participate in its markets, with the Internal Credit Score and Unsecured Credit Allowance, if any, previously determined by PJM.

B. Risk Management Review

PJM shall also conduct a periodic compliance verification process to review and verify, as applicable, Participants' risk management policies, practices, and procedures pertaining to the Participant's activities in any PJM Markets. PJM shall review such documentation to verify that it appears generally to conform to prudent risk management practices for entities trading in any PJM Markets. Participant shall also provide a high level summary by the chief risk officer or other Principal regarding any material violations, breaches, or compliance or disciplinary actions in connection with such risk management policies, practices and procedures within the prior twelve (12) months.

If a third-party industry association publishes or modifies principles or best practices relating to risk management in North American markets for electricity, natural gas or electricity-related commodity products, PJM may, following stakeholder discussion and with no less than six (6) months prior notice to stakeholders, consider such principles or best practices in evaluating the Participant's risk controls.

PJM will prioritize the verification of risk management policies based on a number of criteria, including but not limited to how long the entity has been in business, the Participant's and its Principals' history of participation in any PJM Markets, and any other information obtained in determining the risk profile of the Participant.

Each Participant's continued eligibility to participate in any PJM Markets is conditioned upon PJM notifying the Participant of successful completion of PJM's verification of the Participant's risk management policies, practices and procedures, as discussed herein. However, if PJM notifies the Participant in writing that it could not successfully complete the verification process, PJM shall allow such Participant fourteen (14) calendar days to provide sufficient evidence for verification prior to declaring the Participant as ineligible to continue to participate in any PJM Markets, which declaration shall be in writing with an explanation of why PJM could not complete the verification. If the Participant does not provide sufficient evidence for verification to PJM within the required cure period, such Participant will be considered in default under this Tariff. PJM may retain outside expertise to perform the review and verification function described in this paragraph. PJM and any third party it may retain will treat as confidential the documentation provided by a Participant under this paragraph, consistent with the applicable provisions of the Agreements. If PJM retains such outside expertise, a Participant may direct in writing that PJM perform the risk management review and verification for such Participant instead of utilizing a third party, provided however, that employees and contract employees of PJM and PJM shall not be considered to be such outside expertise or third parties.

Participants are solely responsible for the positions they take and the obligations they assume in any PJM Markets. PJM hereby disclaims any and all responsibility to any Participant or PJM

Member associated with Participant’s submitting or failure to submit its annual certification or PJM’s review and verification of a Participant’s risk policies, procedures and controls. Such review and verification is limited to demonstrating basic compliance by a Participant showing the existence of written policies, procedures and controls to limit its risk in any PJM Markets and does not constitute an endorsement of the efficacy of such policies, procedures or controls.

V. FORMS OF CREDIT SUPPORT

In order to satisfy their PJM credit requirements Participants may provide credit support in a PJM-approved form and amount pursuant to the guidelines herein, provided that, notwithstanding anything to the contrary in this section, a Market Participant in PJM’s FTR markets shall meet its credit support requirements related to those FTR markets with either cash or Letters of Credit.

Unless otherwise restricted by PJM, credit support provided may be used by PJM to secure the payment of Participant’s financial obligations under the Agreements.

Collateral which may no longer be required to be maintained under provisions of the Agreements, shall be returned at the request of a Participant, no later than two (2) Business Days following determination by PJM within a commercially reasonable period of time that such Collateral is not required.

Except when an Event of Default has occurred, a Participant may substitute an approved PJM form of Collateral for another PJM approved form of Collateral of equal value.

A. Cash Deposit

Cash provided by a Participant as Collateral will be held in a depository account by PJM. Interest shall accrue to the benefit of the Participant, provided that PJM may require Participants to provide appropriate tax and other information in order to accrue such interest credits.

PJM may establish an array of investment options among which a Participant may choose to invest its cash deposited as Collateral. The depository account shall be held in PJM’s name in a banking or financial institution acceptable to PJM. Where practicable, PJM may establish a means for the Participant to communicate directly with the bank or financial institution to permit the Participant to direct certain activity in the PJM account in which its Collateral is held. PJM will establish and publish procedural rules, identifying the investment options and respective discounts in Collateral value that will be taken to reflect any liquidation, market and/or credit risk presented by such investments.

Cash Collateral may not be pledged or in any way encumbered or restricted from full and timely use by PJM in accordance with terms of the Agreements.

PJM has the right to liquidate all or a portion of the Collateral account balance at its discretion to satisfy a Participant’s Total Net Obligation to PJM in the Event of Default under this Attachment Q or one or more of the Agreements.

B. Letter of Credit

An unconditional, irrevocable standby Letter of Credit can be utilized to meet the Collateral requirement. As stated below, the form, substance, and provider of the Letter of Credit must all be acceptable to PJM.

(1) The Letter of Credit will only be accepted from U.S.-based financial institutions or U.S. branches of foreign financial institutions ("financial institutions") that have a minimum corporate debt rating of "A" by Standard & Poor's or Fitch Ratings, or "A2" from Moody's Investors Service, or an equivalent short term rating from one of these agencies. PJM will consider the lowest applicable rating to be the rating of the financial institution. If the rating of a financial institution providing a Letter of Credit is lowered below A/A2 by any Rating Agency, then PJM may require the Participant to provide a Letter of Credit from another financial institution that is rated A/A2 or better, or to provide a cash deposit. If a Letter of Credit is provided from a U.S. branch of a foreign institution, the U.S. branch must itself comply with the terms of this Attachment Q, including having its own acceptable credit rating.

(2) The Letter of Credit shall state that it shall renew automatically for successive one-year periods, until terminated upon at least ninety (90) calendar days prior written notice from the issuing financial institution. If PJM or PJM receives notice from the issuing financial institution that the current Letter of Credit is being cancelled or expiring, the Participant will be required to provide evidence, acceptable to PJM, that such Letter of Credit will be replaced with appropriate Collateral, effective as of the cancellation date of the Letter of Credit, no later than thirty (30) calendar days before the cancellation date of the Letter of Credit, and no later than ninety (90) calendar days after the notice of cancellation. Failure to do so will constitute a default under this Attachment Q and one or more of the Agreements.

(3) PJM will post on its web site an acceptable standard form of a Letter of Credit that should be utilized by a Participant choosing to submit a Letter of Credit to establish credit at PJM. If the Letter of Credit varies in any way from the standard format, it must first be reviewed and approved by PJM. All costs associated with obtaining and maintaining a Letter of Credit and meeting the Attachment Q provisions are the responsibility of the Participant.

(4) PJM may accept a Letter of Credit from a financial institution that does not meet the credit standards of this Attachment Q provided that the Letter of Credit has third-party support, in a form acceptable to PJM, from a financial institution that does meet the credit standards of this Attachment Q.

C. Corporate Guaranty

An irrevocable and unconditional Corporate Guaranty may be utilized to establish an Unsecured Credit Allowance for a Participant. Such credit will be considered a transfer of Unsecured Credit from the Guarantor to the Participant, and will not be considered a form of Collateral.

PJM will post on its web site an acceptable form that should be utilized by a Participant choosing to establish its credit with a Corporate Guaranty. If the Corporate Guaranty varies in any way from the PJM format, it must first be reviewed and approved by PJM before it may be applied to satisfy the Participant's credit requirements.

The Corporate Guaranty must be signed by an officer of the Guarantor, and must demonstrate that it is duly authorized in a manner acceptable to PJM. Such demonstration may include either a corporate seal on the Corporate Guaranty itself, or an accompanying executed and sealed secretary's certificate from the Guarantor's corporate secretary noting that the Guarantor was duly authorized to provide such Corporate Guaranty and that the person signing the Corporate Guaranty is duly authorized, or other manner acceptable to PJM.

PJM will evaluate the creditworthiness of a Guarantor and will establish any Unsecured Credit granted through a Corporate Guaranty using the methodology and requirements established for Participants requesting an Unsecured Credit Allowance as described herein. Foreign Guaranties and Canadian Guaranties shall be subject to additional requirements as established herein.

If PJM determines at any time that a Material Adverse Change in the financial condition of the Guarantor has occurred, or if the Corporate Guaranty comes within thirty (30) calendar days of expiring without renewal, PJM may reduce or eliminate any Unsecured Credit afforded to the Participant through the guaranty. Such reduction or elimination may require the Participant to provide Collateral within the applicable cure period. If the Participant fails to provide the required Collateral, the Participant shall be in default under this Attachment Q.

All costs associated with obtaining and maintaining a Corporate Guaranty and meeting the Attachment Q provisions are the responsibility of the Participant.

1. Foreign Guaranties

A Foreign Guaranty is a Corporate Guaranty that is provided by a Credit Affiliate entity that is domiciled in a country other than the United States or Canada. The entity providing a Foreign Guaranty on behalf of a Participant is a Foreign Guarantor. A Participant may provide a Foreign Guaranty in satisfaction of part of its credit obligations or voluntary credit provision at PJM provided that all of the following conditions are met:

PJM reserves the right to deny, reject, or terminate acceptance of any Foreign Guaranty at any time, including for material adverse circumstances or occurrences.

(a) A Foreign Guaranty:
- (i) Must contain provisions equivalent to those contained in PJM's standard form of Foreign Guaranty with any modifications subject to review and approval by PJM counsel.
- (ii) Must be denominated in US currency.
- (iii) Must be written and executed solely in English, including any duplicate originals.
- (iv) Will not be accepted towards a Participant's Unsecured Credit Allowance for more than the following limits, depending on the Foreign Guarantor's credit rating:

Rating of Foreign Guarantor	Maximum Accepted Guaranty if Country Rating is AAA	Maximum Accepted Guaranty if Country Rating is AA+
A- and above	USD50,000,000	USD30,000,000
BBB+	USD30,000,000	USD20,000,000
BBB	USD10,000,000	USD10,000,000
BBB- or below	USD 0	USD 0

(v) May not exceed 50% of the Participant's total credit, if the Foreign Grantor is rated less than BBB+.

(b) A Foreign Guarantor:
(i) Must satisfy all provisions of this Attachment Q applicable to domestic Guarantors.
(ii) Must be a Credit Affiliate of the Participant.
(iii) Must maintain an agent for acceptance of service of process in the United States; such agent shall be situated in the Commonwealth of Pennsylvania, absent legal constraint.
(iv) Must be rated by at least one Rating Agency acceptable to PJM; the credit strength of a Foreign Guarantor may not be determined based on an evaluation of its audited financial statements without an actual credit rating as well.
(v) Must have a senior unsecured (or equivalent, in PJM's sole discretion) rating of BBB (one notch above BBB-) or greater by any and all agencies that provide rating coverage of the entity.
(vi) Must provide audited financial statements, in US GAAP format or any other format acceptable to PJM, with clear representation of net worth, intangible assets, and any other information PJM may require in order to determine the entity's Unsecured Credit Allowance.
(vii) Must provide a Secretary's Certificate from the Participant's corporate secretary certifying the adoption of Corporate Resolutions:
1. Authorizing and approving the Guaranty; and
2. Authorizing the Officers to execute and deliver the Guaranty on behalf of the Guarantor.
(viii) Must be domiciled in a country with a minimum long-term sovereign (or equivalent) rating of AA+/Aa1, with the following conditions:
1. Sovereign ratings must be available from at least two rating agencies acceptable to PJM (e.g. S&P, Moody's, Fitch, DBRS).
2. Each agency's sovereign rating for the domicile will be considered to be the lowest of: country ceiling, senior unsecured government debt, long-term foreign currency sovereign rating, long-term local currency sovereign rating, or other equivalent measures, at PJM's sole discretion.
3. Whether ratings are available from two or three agencies, the lowest of the two or three will be used.
(ix) Must be domiciled in a country that recognizes and enforces judgments of US courts.

(x) Must demonstrate financial commitment to activity in the United States as evidenced by one of the following:
    1. American Depository Receipts (ADR) are traded on the New York Stock Exchange, American Stock Exchange, or NASDAQ.
    2. Equity ownership worth over USD 100,000,000 in the wholly-owned or majority owned subsidiaries in the United States.

(xi) Must satisfy all other applicable provisions of the PJM Tariff and/or Operating Agreement, including this Attachment Q.

(xii) Must pay for all expenses incurred by PJM related to reviewing and accepting a foreign guaranty beyond nominal in-house credit and legal review.

(xiii) Must, at its own cost, provide PJM with independent legal opinion from an attorney/solicitor of PJM’s choosing and licensed to practice law in the United States and/or Guarantor’s domicile, in form and substance acceptable to PJM in its sole discretion, confirming the enforceability of the Foreign Guaranty, the Guarantor’s legal authorization to grant the Guaranty, the conformance of the Guaranty, Guarantor, and Guarantor's domicile to all of these requirements, and such other matters as PJM may require in its sole discretion.

2. Canadian Guaranties

The entity providing a Canadian Guaranty on behalf of a Participant is a Canadian Guarantor. A Participant may provide a Canadian Guaranty in satisfaction of part of its credit obligations or voluntary credit provision at PJM provided that all of the following conditions are met.

PJM reserves the right to deny, reject, or terminate acceptance of any Canadian Guaranty at any time for reasonable cause, including material adverse circumstances or occurrences.

(a) A Canadian Guaranty:

(i) Must contain provisions equivalent to those contained in PJM’s standard form of Foreign Guaranty with any modifications subject to review and approval by PJM counsel.

(ii) Must be denominated in US currency.

(iii) Must be written and executed solely in English, including any duplicate originals.

(b) A Canadian Guarantor:

(i) Must be a Credit Affiliate of the Participant.

(ii) Must satisfy all provisions of this Attachment Q applicable to domestic Guarantors.

(iii) Must maintain an agent for acceptance of service of process in the United States; such agent shall be situated in the Commonwealth of Pennsylvania, absent legal constraint.

(iv) Must be rated by at least one Rating Agency acceptable to PJM; the credit strength of a Canadian Guarantor may not be determined based on an evaluation of its audited financial statements without an actual credit rating as well.

(v) Must provide audited financial statements, in US GAAP format or any other format acceptable to PJM with clear representation of net worth, intangible assets, and any other information PJM may require in order to determine the entity's Unsecured Credit Allowance.

(vi) Must satisfy all other applicable provisions of the PJM Tariff and/or Operating Agreement, including this Attachment Q.

D. Surety Bond

An unconditional, irrevocable surety bond can be utilized to meet the Collateral requirement for Participants. As stated below, the form, substance, and provider of the surety bond must all be acceptable to PJM.

(i) An acceptable surety bond must be payable immediately upon demand without prior demonstration of the validity of the demand. The surety bond will only be accepted from a U.S. Treasury-listed approved surety that has either (i) a minimum corporate debt rating of “A” by Standard & Poor’s or Fitch Ratings, or “A2” from Moody’s Investors Service, or an equivalent short term rating from one of these agencies, or (ii) a minimum insurer rating of “A” by A.M. Best. PJMSettlement will consider the lowest applicable rating to be the rating of the surety. If the rating of a surety providing a surety bond is lowered below A/A2 by any rating agency, then PJMSettlement may require the Participant to provide a surety bond from another surety that is rated A/A2 or better, or to provide another form of Collateral.

(ii) The surety bond shall have an initial period of at least one year, and shall state that it shall renew automatically for successive one-year periods, until terminated upon at least ninety (90) days prior written notice from the issuing surety. If PJM receives notice from the issuing surety that the current surety bond is being cancelled, the Participant will be required to provide evidence, acceptable to PJM, that such surety bond will be replaced with appropriate Collateral, effective as of the cancellation date of the surety bond, no later than thirty (30) days before the cancellation date of the surety bond, and no later than ninety (90) days after the notice of cancellation. Failure to do so will constitute a default under this Attachment Q and one of more of the Agreements enabling PJM to immediately demand payment of the full value of the surety bond.

(iii) PJM will post on its web site an acceptable standard form of a surety bond that should be utilized by a Participant choosing to submit a surety bond to establish credit at PJM. The acceptable standard form of surety bond will include non-negotiable provisions, including but not be limited to, a payment on demand feature, requirement that the bond be construed pursuant to Pennsylvania law, making the surety’s obligation to pay out on the bond absolute and unconditional irrespective of the principal’s (Market Participant’s) bankruptcy, terms of any other agreements, investigation of the Market Participant by any entity or governmental authority, or PJM first attempting to collect payment from the Market Participant, and will require, among other things, that (a) the surety waive ***all*** rights that would be available to a principal or surety under the law, including but not limited to any right to investigate or verify any matter related to a demand for payment, rights to set-off amounts due by PJM to the Market Participant, and all counterclaims, (b) the surety expressly waive ***all*** of its and the principal's defenses, including illegality, fraud in the inducement, reliance on statements or representations of PJM and every other typically available defense; (c) the language of the bond that is determinative of the surety's obligation, and not the underlying agreement or arrangement between the principal and the oblige; (d) the bond shall not be conditioned on PJM first resorting to any other means of security or collateral, or pursuing any other remedies it may have; and (e) the surety acknowledge the continuing nature of its obligations in the event of termination or nonrenewal of the surety bond to make clear the surety remains liable for any obligations that arose before the effective date of its notice of cancellation of the surety bond. If the surety bond varies in any way from the standard format, it must first be reviewed and approved by PJM. PJM shall not accept any surety bond that varies in any material way from the standard format.

(iv) All costs associated with obtaining and maintaining a surety bond and meeting the Attachment Q provisions are the responsibility of the Participant.

(v) PJM shall not accept surety bonds with an aggregate value greater than $10 million dollars ($10,000,000) issued by any individual surety on behalf of any individual Participant.

(vi) PJM shall not accept surety bonds with an aggregate value greater than $50 million dollars ($50,000,000) issued by any individual surety.

E. PJM Administrative Charges

Collateral or credit support held by PJM shall also secure obligations to PJM for PJM administrative charges, and may be liquidated to satisfy all such obligations in an Event of Default.

F. Collateral and Credit Support Held by PJM

Collateral or credit support submitted by Participants and held by PJM shall be held by PJM for the benefit of PJM.

VI. SUPPLEMENTAL CREDIT REQUIREMENTS FOR SCREENED TRANSACTIONS

A. Virtual and Export Transaction Screening

1. Credit for Virtual and Export Transactions

Export Transactions and Virtual Transactions both utilize Credit Available for Virtual Transactions to support their credit requirements.

PJM does not require a Market Participant to establish separate or additional credit for submitting Virtual or Export Transactions; however, once transactions are submitted and accepted by PJM, PJM may require credit supporting those transactions to be held until the transactions are completed and their financial impact incorporated into the Market Participant's Obligations. If a Market Participant chooses to establish additional Collateral and/or Unsecured Credit Allowance in order to increase its Credit Available for Virtual Transactions, the Market Participant's Working Credit Limit for Virtual Transactions shall be increased in accordance with the definition thereof. The Collateral and/or Unsecured Credit Allowance available to increase a Market Participant's Credit Available for Virtual Transactions shall be the amount of Collateral and/or Unsecured Credit Allowance available after subtracting any credit required for Minimum Participation Requirements, FTR, RPM or other credit requirement determinants defined in this Attachment Q, as applicable.

If a Market Participant chooses to provide additional Collateral in order to increase its Credit Available for Virtual Transactions PJM may establish a reasonable timeframe, not to exceed three months, for which such Collateral must be maintained. PJM will not impose such restriction on a deposit unless a Market Participant is notified prior to making the deposit. Such restriction, if applied, shall be applied to all future deposits by all Market Participants engaging in Virtual Transactions.

A Market Participant may increase its Credit Available for Virtual Transactions by providing additional Collateral to PJM. PJM will make a good faith effort to make new Collateral available as Credit Available for Virtual Transactions as soon as practicable after confirmation of receipt. In any event, however, Collateral received and confirmed by noon on a Business Day will be applied (as provided under this Attachment Q) to Credit Available for Virtual Transactions no later than 10:00 am on the following Business Day. Receipt and acceptance of wired funds for cash deposit shall mean actual receipt by PJM's bank, deposit into PJM's customer deposit account, confirmation by PJM that such wire has been received and deposited, and entry into PJM's credit system. Receipt and acceptance of letters of credit or surety bonds shall mean receipt of the original Letter of Credit or surety bond, or amendment thereto, confirmation from PJM's credit and legal staffs that such Letter of Credit or surety bond, or amendment thereto conforms to PJM's requirements, which confirmation shall be made in a reasonable and practicable timeframe, and entry into PJM's credit system. To facilitate this process, bidders submitting additional Collateral for the purpose of increasing their Credit Available for Virtual Transactions are advised to submit such Collateral well in advance of the desired time, and to specifically notify PJM of such submission.

A Market Participant wishing to submit Virtual or Export Transactions must allocate within PJM's credit system the appropriate amount of Credit Available for Virtual Transactions to the virtual and export allocation sections within each customer account in which it wishes to submit such transactions.

2. Virtual Transaction Screening

All Virtual Transactions submitted to PJM shall be subject to a credit screen prior to acceptance in the Day-ahead Energy Market. The credit screen is applied separately for each of a Market Participant's customer accounts. The credit screen process will automatically reject Virtual Transactions submitted by the Market Participant in a customer account if the Market Participant's Credit Available for Virtual Transactions, allocated on a customer account basis, is exceeded by the Virtual Credit Exposure that is calculated based on the Market Participant's Virtual Transactions submitted, as described below.

A Market Participant's Virtual Credit Exposure will be calculated separately for each customer account on a daily basis for all Virtual Transactions submitted by the Market Participant for the next Operating Day using the following equation:

Virtual Credit Exposure = INC and DEC Exposure + Up-to Congestion Exposure
Where:

(a) INC and DEC Exposure for each customer account is calculated as:

(i) ((the total MWh bid or offered, whichever is greater, hourly at each node) x the Nodal Reference Price x 1 day) summed over all nodes and all hours; plus (ii) ((the difference between the total bid MWh cleared and total offered MWh cleared hourly at each node) x Nodal Reference Price) summed over all nodes and all hours for the previous cleared Day-ahead Energy Market.

(b) Up-to Congestion Exposure for each customer account is calculated as:

(i) Total MWh bid hourly for each Up-to Congestion Transaction x (price bid – Up-to Congestion Reference Price) summed over all Up-to Congestion Transactions and all hours; plus (ii) Total MWh cleared hourly for each Up-to Congestion Transaction x (cleared price – Up-to Congestion Reference Price) summed over all Up-to Congestion Transactions and all hours for the previous cleared Day-ahead Energy Market, provided that hours for which the calculation for an Up-to Congestion Transaction is negative, it shall be deemed to have a zero contribution to the sum.

3. Export Transaction Screening

Export Transactions in the Real-time Energy Market shall be subject to Export Transaction Screening. Export Transaction Screening may be performed either for the duration of the entire Export Transaction, or separately for each time interval comprising an Export Transaction. PJM will deny or curtail all or a portion (based on the relevant time interval) of an Export Transaction if that Export Transaction, or portion thereof, would otherwise cause the Market Participant's Export Credit Exposure to exceed its Credit Available for Export Transactions. Export Transaction Screening shall be applied separately for each Operating Day and shall also be applied to each Export Transaction one or more times prior to the market clearing process for each relevant time interval. Export Transaction Screening shall not apply to transactions established directly by and between PJM and a neighboring Balancing Authority for the purpose of maintaining reliability.

A Market Participant’s credit exposure for an individual Export Transaction shall be the MWh volume of the Export Transaction for each relevant time interval multiplied by each relevant Export Transaction Price Factor and summed over all relevant time intervals of the Export Transaction.

B. RPM Auction and Price Responsive Demand Credit Requirements

Settlement during any Delivery Year of cleared positions resulting or expected to result from any RPM Auction shall be included as appropriate in Peak Market Activity, and the provisions of this Attachment Q shall apply to any such activity and obligations arising therefrom. In addition, the provisions of this section shall apply to any entity seeking to participate in any RPM Auction, to address credit risks unique to such auctions. The provisions of this section also shall apply under certain circumstances to PRD Providers that seek to commit Price Responsive Demand pursuant to the provisions of the Reliability Assurance Agreement.

Credit requirements described herein for RPM Auctions and RPM bilateral transactions are applied separately for each customer account of a Market Participant. Market Participants wishing to participate in an RPM Auction or enter into RPM bilateral transactions must designate the appropriate amount of credit to each account in which their offers are submitted.

1. Applicability

A Market Participant seeking to submit a Sell Offer in any RPM Auction based on any Capacity Resource for which there is a materially increased risk of nonperformance must satisfy the credit requirement specified herein before submitting such Sell Offer. A PRD Provider seeking to commit Price Responsive Demand for which there is a materially increased risk of non-performance must satisfy the credit requirement specified herein before it may commit the Price Responsive Demand. Credit must be maintained until such risk of non-performance is substantially eliminated, but may be reduced commensurate with the reduction in such risk, as set forth in section IV.B.3 below.

For purposes of this provision, a resource for which there is a materially increased risk of nonperformance shall mean: (i) a Planned Generation Capacity Resource; (ii) a Planned Demand Resource or an Energy Efficiency Resource; (iii) a Qualifying Transmission Upgrade; (iv) an existing or Planned Generation Capacity Resource located outside the PJM Region that at the time it is submitted in a Sell Offer has not secured firm transmission service to the border of the PJM Region sufficient to satisfy the deliverability requirements of the Reliability Assurance Agreement; or (v) Price Responsive Demand to the extent the responsible PRD Provider has not registered PRD-eligible load at a PRD Substation level to satisfy its Nominal PRD Value commitment, in accordance with Reliability Assurance Agreement, Schedule 6.1.

2. Reliability Pricing Model Auction and Price Responsive Demand Credit Requirement

Except as provided for Credit-Limited Offers below, for any resource specified in section IV.B.1 above, other than Price Responsive Demand, the credit requirement shall be the RPM Auction Credit Rate, as provided in section IV.B.4 below, times the megawatts to be offered for sale from such resource in an RPM Auction. For Qualified Transmission Upgrades, the credit requirements shall be based on the Locational Deliverability Area in which such upgrade was to increase the Capacity Emergency Transfer Limit. However, the credit requirement for Planned Financed Generation Capacity Resources and Planned External Financed Generation Capacity Resources shall be one half of the product of the RPM Auction Credit Rate, as provided in section IV.B.4 below, times the megawatts to be offered for sale from such resource in a Reliability Pricing Model Auction. The RPM Auction Credit Requirement for each Market Participant shall be determined on a customer account basis, separately for each customer account of a Market Participant, and shall be the sum of the credit requirements for all such resources to be offered by such Market Participant in the auction or, as applicable, cleared by such Market Participant in the relevant auctions. For Price Responsive Demand, the credit requirement shall be based on the Nominal PRD Value (stated in Unforced Capacity terms) times the Price Responsive Demand Credit Rate as set forth in section IV.B.5 below. Except for Credit-Limited Offers, the RPM Auction Credit requirement for a Market Participant will be reduced for any Delivery Year to the extent less than all of such Market Participant’s offers clear in the Base Residual Auction or any Incremental Auction for such Delivery Year. Such reduction shall be proportional to the quantity, in megawatts, that failed to clear in such Delivery Year.

A Sell Offer based on a Planned Generation Capacity Resource, Planned Demand Resource, or Energy Efficiency Resource may be submitted as a Credit-Limited Offer. A Market Participant electing this option shall specify a maximum amount of Unforced Capacity, in megawatts, and a maximum credit requirement, in dollars, applicable to the Sell Offer. A Credit-Limited Offer shall clear the RPM Auction in which it is submitted (to the extent it otherwise would clear based on the other offer parameters and the system's need for the offered capacity) only to the extent of the lesser of: (i) the quantity of Unforced Capacity that is the quotient of the division of the specified maximum credit requirement by the Auction Credit Rate resulting from section IV.B.4.b. below; and (ii) the maximum amount of Unforced Capacity specified in the Sell Offer. For a Market Participant electing this alternative, the RPM Auction Credit requirement applicable prior to the posting of results of the auction shall be the maximum credit requirement specified in its Credit-Limited Offer, and the RPM Auction Credit requirement subsequent to posting of the results will be the Auction Credit Rate, as provided in section IV.B.4.b, c. or d. of this Attachment Q, as applicable, times the amount of Unforced Capacity from such Sell Offer that cleared in the auction. The availability and operational details of Credit-Limited Offers shall be as described in the PJM Manuals.

As set forth in section IV.B.4 below, a Market Participant's Auction Credit requirement shall be determined separately for each Delivery Year.

3. Reduction in Credit Requirement

As specified below, the RPM Auction Credit Rate may be reduced under certain circumstances after the auction has closed.

The Price Responsive Demand credit requirement shall be reduced as and to the extent the PRD Provider registers PRD-eligible load at a PRD Substation level to satisfy its Nominal PRD Value commitment, in accordance with Reliability Assurance Agreement, Schedule 6.1.

In addition, the RPM Auction Credit requirement for a Market Participant for any given Delivery Year shall be reduced periodically, after the Market Participant has provided PJM a written request for each reduction, accompanied by documentation sufficient for PJM to verify attainment of required milestones or satisfaction of other requirements, and PJM has verified that the Market Participant has successfully met progress milestones for its Capacity Resource that reduce the risk of non-performance, as follows:

(a) For Planned Demand Resources and Energy Efficiency Resources, the RPM Auction Credit requirement will be reduced in direct proportion to the megawatts of such Demand Resource that the Resource Provider qualifies as a Capacity Resource, in accordance with the procedures established under the Reliability Assurance Agreement.

(b) For Existing Generation Capacity Resources located outside the PJM Region that have not secured sufficient firm transmission to the border of the PJM Region prior to the auction in which such resource is first offered, the RPM Auction Credit requirement shall be reduced in direct proportion to the megawatts of firm transmission service secured by the Market Participant that qualify such resource under the deliverability requirements of the Reliability Assurance Agreement.

(c) For Planned Generation Capacity Resources located in the PJM Region, the RPM Auction Credit requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals.

Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Effective Date of Interconnection Service Agreement	50%
Financial Close	15%
Full Notice to Proceed and Commencement of Construction (e.g., footers poured)	5%
Main Power Generating Equipment Delivered	5%
Commencement of Interconnection Service	25%

For externally financed projects, the Market Participant must submit with its request for reduction a sworn, notarized certification of a duly authorized independent engineer for the Financial Close, Full Notice to Proceed and Commencement of Construction, and Main Power Generating Equipment Delivered milestones.

For internally financed projects, the Market Participant must submit with its request for reduction a sworn, notarized certification of a duly authorized officer of the Market Participant for the Financial Close milestone and either a duly authorized independent engineer or Professional Engineer for the Full Notice to Proceed and Commencement of Construction and the Main Power Generating Equipment Delivered milestones.

The required certifications must be in a form acceptable to PJM, certifying that the engineer or officer, as applicable, has personal knowledge, or has engaged in a diligent inquiry to determine, that the milestone has been achieved and that, based on its review of the relevant project information, the engineer or officer, as applicable, is not aware of any information that could reasonably cause it to believe that the Capacity Resource will not be in-service by the beginning of the applicable Delivery Year. The Market Participant shall, if requested by PJM, supply to PJM on a confidential basis all records and documents relating to the engineer's and/or officer's certifications.

(d) For Planned External Generation Capacity Resources, the RPM Auction Credit requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals; provided, however, that the total percentage reduction in the RPM Auction Credit requirement shall be no greater than the quotient of (i) the MWs of firm transmission service that the Market Participant has secured for the complete transmission path divided by (ii) the MWs of firm transmission service required to qualify such resource under the deliverability requirements of the Reliability Assurance Agreement.

Credit Reduction Milestones for Planned External Generation Capacity Resources	
Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Effective Date of the equivalent of an Interconnection Service Agreement	50%
Financial Close	15%
Full Notice to Proceed and Commencement of Construction (e.g., footers poured)	5%
Main Power Generating Equipment Delivered	5%
Commencement of Interconnection Service	25%

To obtain a reduction in its RPM Auction Credit requirement, the Market Participant must demonstrate satisfaction of the applicable milestone in the same manner as set forth for Planned Generation Capacity Resources in subsection (c) above.

(e) For Planned Financed Generation Capacity Resources located in the PJM Region, the RPM Auction Credit requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals.

Credit Reduction Milestones for Planned Financed Generation Capacity Resources	
Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Full Notice to Proceed	50%
Commencement of Construction (e.g., footers poured)	15%
Main Power Generating Equipment Delivered	10%
Commencement of Interconnection Service	25%

To obtain a reduction in its RPM Auction Credit requirement, the Market Participant must demonstrate satisfaction of the applicable milestone in the same manner as set forth for Planned Generation Capacity Resources in subsection (c) above.

(f) For Planned External Financed Generation Capacity Resources, the RPM Auction Credit Requirement shall be reduced as the Capacity Resource attains the milestones stated in the following table and as further described in the PJM Manuals; provided, however, that the total percentage reduction in the RPM Auction Credit requirement, including the initial 50% reduction for being a Planned External Financed Generation Capacity Resources, shall be no greater than the quotient of (i) the MWs of firm transmission service that the Market Participant has secured for the complete transmission path divided by (ii) the MWs of firm transmission service required to qualify such resource under the deliverability requirements of the Reliability Assurance Agreement.

Credit Reduction Milestones for Planned External Financed Generation Capacity	
Milestones	**Increment of reduction from initial RPM Auction Credit requirement**
Full Notice to Proceed	50%
Commencement of Construction (e.g., footers poured)	15%
Main Power Generating Equipment Delivered	10%
Commencement of Interconnection Service	25%

To obtain a reduction in its RPM Auction Credit requirement, the Market Participant must demonstrate satisfaction of the applicable milestone in the same manner as set forth for Planned Generation Capacity Resources in subsection (c) above.

(g) For Qualifying Transmission Upgrades, the RPM Auction Credit requirement shall be reduced to 50% of the amount calculated under section IV.B.2 above beginning as of the effective date of the latest associated Interconnection Service Agreement (or, when a project will have no such agreement, an Upgrade Construction Service Agreement), and shall be reduced to zero on the date the Qualifying Transmission Upgrade is placed in service.

4. RPM Auction Credit Rate

As set forth in the PJM Manuals, a separate Auction Credit Rate shall be calculated for each Delivery Year prior to each RPM Auction for such Delivery Year, as follows:

(a) Prior to the posting of the results of a Base Residual Auction for a Delivery Year, the Auction Credit Rate shall be:

(i) For all Capacity Resources other than Capacity Performance Resources, (the greater of (A) 0.3 times the Net Cost of New Entry for the PJM Region for such Delivery Year, in MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year; and

(ii) For Capacity Performance Resources, the greater of ((A) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year.

(iii) For Seasonal Capacity Performance Resources, the same as the Auction Credit Rate for Capacity Performance Resources, but reduced to be proportional to the number of calendar days in the relevant season.

(b) Subsequent to the posting of the results from a Base Residual Auction, the Auction Credit Rate used for ongoing credit requirements for supply committed in such auction shall be:

(i) For all Capacity Resources other than Capacity Performance Resources, (the greater of (A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located) times the number of calendar days in such Delivery Year; and

(ii) For Capacity Performance Resources, the (greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located) or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery year or for the Relevant LDA, in $/MW-day minus (the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located)] times the number of calendar days in such Delivery Year).

(iii) For Seasonal Capacity Performance Resources, the same as the Auction Credit Rate for Capacity Performance Resources, but reduced to be proportional to the number of calendar days in the relevant season.

(c) For any resource not previously committed for a Delivery Year that seeks to participate in an Incremental Auction, the Auction Credit Rate shall be:

(i) For all Capacity Resources other than Capacity Performance Resources, (the greater of (A) 0.3 times the Net Cost of New Entry for the PJM Region for such Delivery Year, in MW-day or (B) 0.24 times the Capacity Resource Clearing Price in the Base Residual Auction for such Delivery Year for the Locational Deliverability Area within which the resource is located or (C) $20 per MW-day) times the number of calendar days in such Delivery Year; and

(ii) For Capacity Performance Resources, the (greater of (A) 0.5 times Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA or (B) $20/MW-day) times the number of calendar days in such Delivery Year.

(d) Subsequent to the posting of the results of an Incremental Auction, the Auction Credit Rate used for ongoing credit requirements for supply committed in such auction shall be:

(i) For Base Capacity Resources: (the greater of (A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located) times the number of calendar days in such Delivery Year, but no greater than the Auction Credit Rate previously established for such resource’s participation in such Incremental Auction pursuant to subsection (c) above) times the number of calendar days in such Delivery Year;

(ii) For Capacity Performance Resources, the greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day minus (the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the resource is located)] times the number of calendar days in such Delivery Year); and

(iii) For Seasonal Capacity Performance Resources, the same as the Auction Credit Rate for Capacity Performance Resources, but reduced to be proportional to the number of calendar days in the relevant season.

(e) For the purposes of this section IV.B.4 and section IV.B.5 below, "Relevant LDA" means the Locational Deliverability Area in which the Capacity Performance Resource is located if a separate Variable Resource Requirement Curve has been established for that Locational Deliverability Area for the Base Residual Auction for such Delivery Year.

5. Price Responsive Demand Credit Rate

(a) For the 2018/2019 through 2022/2023 Delivery Years:

(i) Prior to the posting of the results of a Base Residual Auction for a Delivery Year, the Price Responsive Demand Credit Rate shall be (the greater of (A) 0.3 times the Net Cost of New Entry for the PJM Region for such Delivery Year, in MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year;

(ii) Subsequent to the posting of the results from a Base Residual Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for Price Responsive Demand committed in such auction shall be (the greater of (A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand load is located, in $/MW-day) times the number of calendar days in such Delivery Year times a final price uncertainty factor of 1.05;

(iii) For any additional Price Responsive Demand that seeks to commit in a Third Incremental Auction in response to a qualifying change in the final LDA load forecast, the Price Responsive Demand Credit Rate shall be the same as the rate for Price Responsive Demand that had cleared in the Base Residual Auction; and

(iv) Subsequent to the posting of the results of the Third Incremental Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for all Price Responsive Demand, shall be (the greater of (i) $20/MW-day or (ii) 0.2 times the Final Zonal Capacity Price for the Locational Deliverability Area within which the Price Responsive Demand is located) times the number of calendar days in such Delivery Year, but no greater than the Price Responsive Demand Credit Rate previously established under subsections (a)(i), (a)(ii), or (a)(iii) of this section for such Delivery Year.

(b) For the 2022/2023 Delivery Year and Subsequent Delivery Years:

(i) Prior to the posting of the results of a Base Residual Auction for a Delivery Year, the Price Responsive Demand Credit Rate shall be (the greater of (A) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (B) $20 per MW-day) times the number of calendar days in such Delivery Year;

(ii) Subsequent to the posting of the results from a Base Residual Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for Price Responsive Demand committed in such auction shall be (the greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand is located, in $/MW-day or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery year or for the Relevant LDA, in $/MW-day minus (the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand is located)] times the number of calendar days in such Delivery Year;

(iii) For any additional Price Responsive Demand that seeks to commit in a Third Incremental Auction in response to a qualifying change in the final LDA load forecast, the Price Responsive Demand Credit Rate shall be (the greater of (A) 0.5 times Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (B) $20/MW-day) times the number of calendar days in such Delivery Year; and

(iv) Subsequent to the posting of the results of the Third Incremental Auction, the Price Responsive Demand Credit Rate used for ongoing credit requirements for all Price Responsive Demand committed in such auction shall be the greater of [(A) $20/MW-day or (B) 0.2 times the Capacity Resource Clearing Price in such auction for the Locational Deliverability Area within which the Price Responsive Demand is located or (C) the lesser of (1) 0.5 times the Net Cost of New Entry for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day or (2) 1.5 times the Net Cost of New Entry (stated on an installed capacity basis) for the PJM Region for such Delivery Year or for the Relevant LDA, in $/MW-day minus (the Capacity Performance Resource Clearing Price in such Incremental Auction for the Locational Deliverability Areas within which the Price

Responsive Demand is located)] times the number of calendar days in such Delivery Year.

6. RPM Seller Credit - Additional Form of Unsecured Credit for RPM

In addition to the forms of credit specified elsewhere in this Attachment Q, RPM Seller Credit shall be available to Market Participants, but solely for purposes of satisfying RPM Auction Credit requirements. If a supplier has a history of being a net seller into PJM Markets, on average, over the past 12 months, then PJM will count as available Unsecured Credit twice the average of that Market Participant's total net monthly PJM bills over the past 12 months. This RPM Seller Credit shall be subject to the cap on available Unsecured Credit as established in section II.G.3 above.

RPM Seller Credit is calculated as a single value for each Market Participant, not separately by account, and must be designated to specific customer accounts in order to be available to satisfy RPM Auction Credit requirements that are calculated in each such customer account.

7. Credit Responsibility for Traded Planned RPM Capacity Resources

PJM may require that credit and financial responsibility for planned Capacity Resources that are traded remain with the original party (which for these purposes, means the party bearing credit responsibility for the planned Capacity Resource immediately prior to trade) unless the receiving party independently establishes consistent with this Attachment Q, that it has sufficient credit with PJM and agrees by providing written notice to PJM that it will fully assume the credit responsibility associated with the traded planned Capacity Resource.

C. Financial Transmission Right Auctions

Credit requirements described herein for FTR activity are applied separately for each customer account of a Market Participant, unless specified otherwise in this section C. FTR Participants must designate the appropriate amount of credit to each separate customer account in which any activity occurs or will occur.

1. FTR Credit Limit.

Participants must maintain their FTR Credit Limit at a level equal to or greater than their FTR Credit Requirement for each applicable account. FTR Credit Limits will be established only by a Participant providing Collateral and designating the available credit to specific accounts.

2. FTR Credit Requirement.

For each Market Participant with FTR activity, PJM shall calculate an FTR Credit Requirement. The FTR Credit Requirement shall be calculated on a portfolio basis for each Market Participant based on (a) initial margin, (b) Auction Revenue Right Credits, (c) Mark-to-Auction Value, (d) application of a 10¢ per MWh minimum value adjustment, and (e) realized gains and/or losses, as set forth in subsections (a)-(e) of this subsection, employing the formula:

Max { Max (IM – ARR – MTA, Ten Cent per Mwh Minimum) – Realized Gains and/or Losses, 0}

Where IM is the initial margin, ARR is Auction Revenue Rights Credits and MTA is the Mark-to-Auction Value. The FTR Credit Requirement may be increased to reflect any change in the value of a Market Participant's portfolio requiring an increase in Collateral as further described below.

(a) Initial Margin

Initial margin shall be calculated in accordance with the following formula:

IM = FTR Obligations IM + FTR Options IM

The model will employ a confidence interval of 97 percent.

(i) FTR Obligations IM

Initial margin values for Financial Transmission Right Obligations shall be determined utilizing a historical simulation value-at-risk methodology that calculates the size and value at risk of the applicable FTR portfolio based on a defined confidence interval and subject to a weighted aggregation method that is represented by a straight sum for long term positions and a combination of straight sum (20%) and weighted root sum of squares (80%) for balance of planning period positions.

(ii) FTR Options IM

The initial margin for Financial Transmission Right Options shall be calculated as the FTR cost minus the FTR Historical Values. FTR Historical Values shall be calculated separately for on-peak, off-peak, and 24-hour FTRs for each month of the year. FTR Historical Values shall be adjusted by plus or minus ten percent for cleared counter flow or prevailing flow FTRs, respectively, in order to mitigate exposure due to uncertainty and fluctuations in actual FTR value. Historical values used in the calculation of FTR Historical Values shall be adjusted when the network simulation model utilized in PJM's economic planning process indicates that transmission congestion will decrease due to certain transmission upgrades that are in effect or planned to go into effect for the following Planning Period. The transmission upgrades to be modeled for this purpose shall only include those upgrades that, individually, or together, have 10% or more impact on the transmission congestion on an individual constraint or constraints with congestion of $5 million or more affecting a common congestion path. The adjustments to historical values shall be the dollar amount of the adjustment shown in the network simulation model.

(b) Auction Revenue Rights Credits

For a given month for which initial margin is calculated, the prorated value of any Auction Revenue Rights Credits held by a Market Participant with Financial Transmission Right Obligations shall be subtracted from the initial margin for that month. In accordance with subsection 3 below, PJM may recalculate Auction Revenue Rights Credits at any time, but shall do so no less frequently than subsequent to each annual FTR auction. If a reduction in such ARR credits at any time increases an FTR Participant's FTR Credit Requirements beyond its credit available for FTR activity, the FTR Participant must increase its Collateral or the FTR Credit Limit.

(c) Mark-to-Auction Value

A Mark-to-Auction Value shall be calculated for each Market Participant in accordance with subsection 7 below.

(d) Ten Cent (10¢) per MWh Minimum Value Adjustment

If the FTR Credit Requirement as calculated pursuant to subsections (a)-(c) above, results in a value that is less than ten cents (10¢) per MWh, the FTR Credit Requirement shall be increased to ten cents (10¢) per MWh. When calculating the portfolio MWh for this comparison, for cleared "Sell" FTRs, the MWh shall be subtracted from the portfolio total; prior to clearing, the MWh for "Sell" FTRs shall not be included in the portfolio total.

(e) Realized Gains and/or Losses

Any realized gains and/or losses resulting from the sale of Financial Transmission Right Obligations will be subtracted from the FTR Credit Requirement. A realized gain will decrease the FTR Credit Requirement (but not below $0.00), whereas a realized loss will increase the FTR Credit Requirement.

3. Rejection of FTR Bids.

Bids submitted into an auction will be rejected if the Market Participant's FTR Credit Requirement including such submitted bids would exceed the Market Participant's FTR Credit Limit, or if the Market Participant fails to provide additional Collateral as required pursuant to provisions related to mark-to-auction.

4. FTR Credit Collateral Returns.

A Market Participant may request from PJM the return of any Collateral no longer required for the FTR markets. PJM is permitted to limit the frequency of such requested Collateral returns, provided that Collateral returns shall be made by PJM at least once per calendar quarter, if requested by a Market Participant.

5. Credit Responsibility for Bilateral Transfers of FTRs.

PJM may require that credit responsibility associated with an FTR bilaterally transferred to a new Market Participant remain with the original party (which for these purposes, means the party bearing credit responsibility for the FTR immediately prior to bilateral transfer) unless and until the receiving party independently establishes, consistent with this Attachment Q, sufficient credit with PJM and agrees through confirmation of the bilateral transfer in PJM's FTR reporting tool that it will meet in full the credit requirements associated with the transferred FTR.

6. FTR Administrative Charge Credit Requirement

In addition to any other credit requirements, PJM may apply a credit requirement to cover the maximum administrative fees that may be charged to a Market Participant for its bids and offers.

7. Mark-to-Auction

A Mark-to-Auction Value shall be calculated separately for each customer account of a Market Participant. For each such customer account, the Mark-to-Auction Value shall be a single number equal to the sum, over all months remaining in the applicable FTR period and for all cleared FTRs in the customer account, of the most recently available cleared auction price applicable to the FTR minus the original transaction price of the FTR, multiplied by the transacted quantity.

The FTR Credit Requirement, as otherwise described above, shall be increased when the Mark-to-Auction Value is negative and decreased when the Mark-to-Auction Value is positive. The increase shall equal the absolute value of the negative Mark-to-Auction Value less the value of ARR credits that are held in the customer account and have not been used to reduce the FTR Credit Requirement prior to application of the Mark-to-Auction Value. PJM shall recalculate ARR credits held by each Market Participant after each annual FTR auction and may also recalculate such ARR credits at any other additional time intervals it deems appropriate. Application of the Mark-to-Auction Value, including the effect from ARR application, shall not decrease the FTR Credit Requirement below the Ten Cent (10¢) per MWh Minimum.

For Market Participant customer accounts for which FTR bids have been submitted into the current FTR auction, if the Market Participant's FTR Credit Requirement exceeds its credit available for the Market Participant's portfolio of FTRs in the tentative cleared solution for an FTR auction (or auction round), PJM shall issue a Collateral Call to the Market Participant, and the Market Participant must fulfill such demand before 4:00 p.m. Eastern Prevailing Time on the following Business Day. If a Market Participant does not timely satisfy such Collateral Call, PJM shall, in coordination with PJM, cause the removal of all of that Market Participant's bids in that FTR auction (or auction round), submitted from such Market Participant’s customer account, and a new cleared solution shall be calculated for the FTR auction (or auction round).

If necessary, PJM shall repeat the auction clearing calculation. PJM shall repeat these mark-to-auction calculations subsequent to any secondary clearing calculation, and PJM shall require affected Market Participants to establish additional credit.

Subsequent to final clearing of an FTR auction or an annual FTR auction round, PJM shall recalculate the FTR Credit Requirement for all FTR portfolios, and, as applicable, issue to each Market Participant a request for Collateral for the total amount by which the FTR Credit Requirement exceeds the credit allocated in any of the Market Participant's accounts. The Market Participant must fulfill such demand by 4:00 p.m. Eastern Prevailing Time on the following Business Day.

If the request for Collateral is not satisfied within the applicable cure period referenced in Operating Agreement, section 15, then such Market Participant shall be restricted in all of its credit-screened transactions. Specifically, such Market Participant may not engage in any Virtual Transactions or Export Transactions, or participate in RPM Auctions or other RPM activity. Such Market Participant may engage only in the selling of open FTR positions, either in FTR auctions or bilaterally, provided such sales would reduce the Market Participant's FTR Credit Requirements. PJM shall not return any Collateral to such Market Participant, and no payment shall be due or payable to such Market Participant, until its credit shortfall is remedied. Market Participant shall allocate any excess or unallocated Collateral to any of its account in which there is a credit shortfall. Market Participants may remedy their credit shortfall at any time through provision of sufficient Collateral.

If a Market Participant fails to satisfy a request for Collateral for two consecutive auctions of overlapping periods, e.g. two balance of Planning Period auctions, an annual FTR auction and a balance of Planning Period auction, or two long term FTR auctions, (for this purpose the four rounds of an annual FTR auction shall be considered a single auction), the Market Participant shall be declared in default of this Attachment Q.

VII. PEAK MARKET ACTIVITY AND WORKING CREDIT LIMIT

A. Peak Market Activity Credit Requirement

PJM shall calculate a Peak Market Activity credit requirement for each Participant. Each Participant must maintain sufficient Unsecured Credit Allowance and/or Collateral, as applicable, and subject to the provisions herein, to satisfy its Peak Market Activity credit requirement.

Peak Market Activity for Participants will be determined semi-annually, utilizing an initial Peak Market Activity, as explained below, calculated after the first complete billing week in the months of April and October. Peak Market Activity shall be the greater of the initial Peak Market Activity, or the greatest amount invoiced for the Participant’s transaction activity for all

PJM Markets and services in any rolling one, two, or three week period, ending within a respective semi-annual period. However, Peak Market Activity shall not exceed the greatest amount invoiced for the Participant's transaction activity for all PJM Markets and services in any rolling one, two or three week period in the prior 52 weeks.
Peak Market Activity shall exclude FTR Net Activity, Virtual Transactions Net Activity, and Export Transactions Net Activity.

When calculating Peak Market Activity, PJM may attribute credits for Regulation service to the days on which they were accrued, rather than including them in the month-end invoice.

The initial Peak Market Activity for Applicants will be determined by PJM based on a review of an estimate of their transactional activity for all PJM Markets and services over the next 52 weeks, which the Applicant shall provide to PJM.

The initial Peak Market Activity for Market Participants and Transmission Customers, calculated at the beginning of each semi-annual period, shall be the three-week average of all non-zero invoice totals over the previous 52 weeks. This calculation shall be performed and applied within three (3) Business Days following the day the invoice is issued for the first full billing week in the current semi-annual period.

Prepayments shall not affect Peak Market Activity unless otherwise agreed to in writing pursuant to this Attachment Q.

Peak Market Activity calculations shall take into account reductions of invoice values effectuated by early payments which are applied to reduce a Participant's Peak Market Activity as contemplated by other terms of this Attachment Q; provided that the initial Peak Market Activity shall not be less than the average value calculated using the weeks for which no early payment was made.

A Participant may reduce its Collateral requirement by agreeing in writing (in a form acceptable to PJM) to make additional payments, including prepayments, as and when necessary to ensure that such Participant's Total Net Obligation at no time exceeds such reduced Collateral requirement.

PJM may, at its discretion, adjust a Participant's Peak Market Activity requirement if PJM determines that the Peak Market Activity is not representative of such Participant's expected activity, as a consequence of known, measurable, and sustained changes. Such changes may include, but shall not be limited to when a Participant makes PJM aware of federal, state or local law that could affect the allocation of charges or credits from a Participant to another party, the loss (without replacement) of short-term load contracts, when such contracts had terms of three months or more and were acquired through state-sponsored retail load programs, but shall not include short-term buying and selling activities.

PJM may waive the credit requirements for a Participant that has no outstanding transactions and agrees in writing that it shall not, after the date of such agreement, incur obligations under any of the Agreements. Such entity's access to all electronic transaction systems administered by PJM shall be terminated.

A Participant receiving unsecured credit may make early payments up to ten times in a rolling 52-week period in order to reduce its Peak Market Activity for credit requirement purposes. Imputed Peak Market Activity reductions for credit purposes will be applied to the billing period for which the payment was received. Payments used as the basis for such reductions must be received prior to issuance or posting of the invoice for the relevant billing period. The imputed Peak Market Activity reduction attributed to any payment may not exceed the amount of Unsecured Credit for which the Participant is eligible.

B. Working Credit Limit

PJM will establish a Working Credit Limit for each Participant against which its Total Net Obligation will be monitored.
If a Participant's Total Net Obligation approaches its Working Credit Limit, PJM may require the Participant to make an advance payment or increase its Collateral in order to maintain its Total Net Obligation below its Working Credit Limit. Except as explicitly provided herein, advance payments shall not serve to reduce the Participant's Peak Market Activity for the purpose of calculating credit requirements.

> Example: After ten (10) calendar days, and with five (5) calendar days remaining before the bill is due to be paid, a Participant approaches its $4.0 million Working Credit Limit. PJM may require a prepayment of $2.0 million in order that the Total Net Obligation will not exceed the Working Credit Limit.

If a Participant exceeds its Working Credit Limit or is required to make advance payments more than ten times during a 52-week period, PJM may require Collateral in an amount as may be deemed reasonably necessary to support its Total Net Obligation.

When calculating Total Net Obligation, PJM may attribute credits for Regulation service to the days on which they were accrued, rather than including them in the month-end invoice.

VIII. SUSPENSION OR LIMITATION ON MARKET PARTICIPATION

If PJM determines that a Participant presents an unreasonable credit risk as determined pursuant to initial or ongoing risk evaluations, as described in section II above, or in the case of any other event which, after notice, lapse of time, or both, would result in an Event of Default, PJM will take steps to mitigate the exposure of any PJM Markets, which may include, but is not limited to, requiring Collateral, additional Collateral or Restricted Collateral or suspending or limiting the Market Participant's ability to participate in the PJM Markets commensurate to the risk to any PJM Markets.

If a Participant fails to reduce or eliminate any unreasonable credit risks to PJM's satisfaction within the applicable cure period including without limitation by posting Collateral, additional Collateral or Restricted Collateral, PJM may treat such failure as an Event of Default.

Notwithstanding the foregoing, a Participant that transacts in FTRs will be eligible to request that PJM exempt or exclude FTR transactions of such Participant from the effect of any such limitations on market activity established by PJM, and PJM may but shall not be required to so exempt or exclude, any FTR transactions that the Participant reasonably demonstrates to PJM it has entered into to "hedge or mitigate commercial risk" arising from its transactions in the PJM Interchange Energy Market that are intended to result in the actual flow of physical energy or ancillary services in the PJM Region, as the phrase "hedge or mitigate commercial risks" is defined under the CFTC's regulations defining the end-user exception to clearing set forth in 17 C.F.R. §50.50(c).

IX. REMEDIES FOR CREDIT BREACH, FINANCIAL DEFAULT OR CREDIT SUPPORT DEFAULT; REMEDIES FOR EVENTS OF DEFAULT

If PJM determines that a Market Participant is in Credit Breach, or that a Financial Default or Credit Support Default exists, PJM may issue to the Market Participant a breach notice and/or a Collateral Call or demand for additional documentation or assurances. At such time, PJM may also suspend payments of any amounts due to the Participant and limit, restrict or rescind the Market Participant's privileges to participate in any or all PJM Markets under the Agreements during any such cure period. Failure to remedy the Credit Breach, Financial Default or to satisfy a Collateral Call or demand for additional documentation or assurances within the applicable cure period described in Operating Agreement, section 15.1.5, shall constitute an Event of Default. If a Participant fails to meet the requirements of this Attachment Q, but then remedies the Credit Breach, Financial Default or Credit Support Default, or satisfies a Collateral Call or demand for additional documentation or assurances within the applicable cure period, then the Participant shall be deemed to again be in compliance with this Attachment Q, so long as no other Credit Breach, Financial Default, Credit Support Default or Collateral Call or demand for additional documentation or assurances has occurred and is continuing.

Only one cure period shall apply to a single event giving rise to a Credit Breach, Financial Default or Credit Support Default. Application of Collateral towards a Financial Default, Credit Breach or Credit Support Breach shall not be considered a cure of such Credit Breach, Financial Default or Credit Support Default unless the Participant is determined by PJM to be in full compliance with all requirements of this Attachment Q after such application.

When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM may take such actions as may be required or permitted under the Agreements to protect the PJM Markets and the PJM Members, including but not limited to (a) suspension and/or termination of the Participant's ongoing Transmission Service, (b) limitation, suspension and/or termination of participation in any PJM Markets, (c) close out and liquidation of the Market Participant's market portfolio, exercising judgment in the manner in which this is achieved in any PJM Markets. When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM also has the immediate right to liquidate all or a portion of a Participant's Collateral at its discretion to satisfy Total Net Obligations to PJM under this Attachment Q or one or more of the Agreements. No remedy for an Event of Default is or shall be deemed to be exclusive of any other available remedy or remedies by contract or under applicable laws and regulations. Each such remedy shall be distinct, separate and cumulative, shall not be deemed inconsistent with or in exclusion of any other available remedy, and shall be in addition to and separate and distinct from every other remedy.

When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM may continue to retain all payments due to a Participant as a cash security for all such Participant's obligations under the Agreements (regardless of any restrictions placed on such Participant's use of Collateral for any account, market activity or capitalization purpose); provided, however, that an Event of Default will not be deemed cured or no longer continuing because PJM is retaining amounts due the Participant, or because PJM has not yet applied Collateral or credit support to any amounts due PJM, unless PJM determines that the Participant has again satisfied all the Collateral requirements and application requirements as a new Applicant for participation in the PJM Markets, and consistent with the requirements and limitations of Operating Agreement, section 15.

In Event of Default by a Participant, PJM may exercise any remedy or action allowed or prescribed by this Attachment Q immediately or following investigation and determination of an orderly exercise of such remedy or action. Delay in exercising any allowed remedy or action shall not preclude PJM from exercising such remedy or action at a later time.

PJM may hold a defaulting Participant's Collateral for as long as such party's positions exist and consistent with this Attachment Q, in order to protect the PJM Markets and PJM's membership, and minimize or mitigate the impacts or potential impacts or risks associated with such Event of Default when an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing.

PJM may apply towards an ongoing Event of Default any amounts that are held or later become available or due to the defaulting Participant through PJM's markets and systems.

In order to cover the Participant's Obligations, PJM may hold a Participant's Collateral indefinitely and specifically through the end of the billing period which includes the 90th day following the last day a Participant had activity, open positions, or accruing obligations (other than reconciliations and true-ups), until such Participant has satisfactorily paid any obligations invoiced through such period and until PJM determines that the Participant's positions represent no risk exposure to the PJM Markets or the PJM Members. Obligations incurred or accrued through such period shall survive any withdrawal from PJM. When an Event of Default under this Attachment Q or one or more of the Agreements has occurred and is continuing, PJM may apply any Collateral to such Participant's Obligations, even if Participant had previously announced and effected its withdrawal from PJM.

X. FTRS UNDER THE COMMODITY EXCHANGE ACT AND THE BANKRUPTCY CODE

Under the terms of the Tariff, PJM Settlement is the counterparty to all transactions in PJM Markets, including but not limited to all FTR transactions, other than (i) any bilateral transactions between Participants, or (ii) with respect to self-supplied or self-scheduled transactions reported to the Office of the Interconnection. Pursuant to the "Final Order in Response to a Petition From Certain Independent System Operators and Regional Transmission Organizations To Exempt Specified Transactions Authorized by a Tariff or Protocol Approved by the Federal Energy Regulatory Commission or the Public Utility Commission of Texas From Certain Provisions of the Commodity Exchange Act Pursuant to the Authority Provided in the Act" 78 Fed. Reg. 19880 (April 2, 2013) (the "CFTC RTO/ISO Order"), the Commodity Futures Trading Commission (the "CFTC") exempts transactions offered or entered into in a market administered by PJM pursuant to the Tariff, including but not limited to FTR transactions, from the provisions of the Commodity Exchange Act and the CFTC's rules applicable to "swaps," with the exception of the CFTC's general anti-fraud and anti-manipulation authority and scienter-based prohibitions.

Notwithstanding the CFTC RTO/ISO Order, for purposes of the United States Bankruptcy Code ("Bankruptcy Code"), all FTR transactions constitute "swap agreements" and/or "forward contracts," and PJM and each FTR Participant is a "forward contract merchant" and/or a "swap participant" within the meaning of the Bankruptcy Code for purposes of FTR transactions.

Pursuant to this Attachment Q and other provisions of the Agreements, PJM already has, and shall continue to have, the following rights (among other rights) with respect to a Market Participant's Event of Default: (a) the right to terminate and/or liquidate any FTR transaction held by that Market Participant; (b) the right to immediately proceed against any Collateral provided by the Market Participant; (c) the right to set-off any obligations due or owing to that Market Participant pursuant to any forward contract, swap agreement, or similar agreement against any amounts due and owing by that Market Participant pursuant to any forward contract, swap agreement, or similar agreement, such arrangement to constitute a "master netting agreement" within the meaning of the Bankruptcy Code; and (d) the right to suspend or limit that Market Participant from entering into further FTR transactions.

For the avoidance of doubt, upon the commencement of a voluntary or involuntary proceeding for a Participant under the Bankruptcy Code, and without limiting any other rights of PJM or obligations of any Participant under the Agreements, PJM may exercise any of its rights against such Participant, including, without limitation (1) the right to terminate and/or liquidate any FTR transaction held by that Participant, (2) the right to immediately proceed against any Collateral provided by that Participant, (3) the right to set off any obligations due and owing to that Participant pursuant to any forward contract, swap agreement and/or master netting agreement against any amounts due and owing by that Participant with respect to an FTR transaction including as a result of the actions taken by PJM pursuant to (a) above, and 4) the right to suspend or limit that Participant from entering into future FTR transactions.

For purposes of the Bankruptcy Code, all transactions, including but not limited to FTR transactions, between PJM, on the one hand, and a Market Participant, on the other hand, are intended to be part of a single integrated agreement, and together with the Agreements constitute a "master netting agreement."

Attachment Q
Appendix 1

PJM MINIMUM PARTICIPATION CRITERIA
ANNUAL OFFICER CERTIFICATION FORM

Participant Name: ____ ("Participant")

I, ____, a duly authorized officer of Participant, understanding that PJM Interconnection, L.L.C. and PJMSettlement, Inc. (“PJMSettlement”) are relying on this certification as evidence that Participant meets the minimum requirements set forth in the PJM Open Access Transmission Tariff ("PJM Tariff"), Attachment Q hereby certify that I have full authority to represent on behalf of Participant and further represent as follows, as evidenced by my initialing each representation in the space provided below:

1. All employees or agents transacting in markets or services provided pursuant to the PJM Tariff or PJM Amended and Restated Operating Agreement (“PJM Operating Agreement”) on behalf of the Participant have received appropriate training and are authorized to transact on behalf of Participant. As used in this representation, the term “appropriate” as used with respect to training means training that is (i) comparable to generally accepted practices in the energy trading industry, and (ii) commensurate and proportional in sophistication, scope and frequency to the volume of transactions and the nature and extent of the risk taken by the participant._________

2. Participant has written risk management policies, procedures, and controls, approved by Participant’s independent risk management function and applicable to transactions in any PJM Markets in which it participates and for which employees or agents transacting in markets or services provided pursuant to the PJM Tariff or PJM Operating Agreement have been trained, that provide an appropriate, comprehensive risk management framework that, at a minimum, clearly identifies and documents the range of risks to which Participant is exposed, including, but not limited to credit risks, liquidity risks and market risks. As used in this representation, a Participant’s “independent risk management function” can include appropriate corporate persons or bodies that are independent of the Participant’s trading functions, such as a risk management committee, a risk officer, a Participant’s board or board committee, or a board or committee of the Participant’s parent company.

   a. Participant is providing to PJM or PJMSettlement, in accordance with Tariff, Attachment Q, section III, with this Annual Officer Certification Form, a copy of its current governing risk management policies, procedures and controls applicable to its activities in any PJM Markets pursuant to Attachment Q or because there have been substantive changes made to such policies, procedures and controls applicable to its market activities since they were last provided to PJM.__________

   b. If the risk management policies, procedures and controls applicable to Participant’s market activities submitted to PJM or PJMSettlement were submitted prior to the current certification, Participant certifies that no substantive changes have been made to such policies, procedures and controls applicable to its market activities since such submission.__________

3. An FTR Participant must make either the following 3.a. or 3.b. additional representations, evidenced by the undersigned officer initialing either the one 3.a. representation or the four 3.b. representations in the spaces provided below:

    a. Participant transacts in PJM's FTR markets with the sole intent to hedge congestion risk in connection with either obligations Participant has to serve load or rights Participant has to generate electricity in the PJM Region ("physical transactions") and monitors all of the Participant's FTR market activity to endeavor to ensure that its FTR positions, considering both the size and pathways of the positions, are either generally proportionate to or generally do not exceed the Participant's physical transactions, and remain generally consistent with the Participant's intention to hedge its physical transactions.__________

    b. On no less than a weekly basis, Participant values its FTR positions and engages in a probabilistic assessment of the hypothetical risk of such positions using analytically based methodologies, predicated on the use of industry accepted valuation methodologies.__________

    Such valuation and risk assessment functions are performed either by persons within Participant's organization independent from those trading in PJM's FTR markets or by an outside firm qualified and with expertise in this area of risk management.__________

    Having valued its FTR positions and quantified their hypothetical risks, Participant applies its written policies, procedures and controls to limit its risks using industry recognized practices, such as value-at-risk limitations, concentration limits, or other controls designed to prevent Participant from purposefully or unintentionally taking on risk that is not commensurate or proportional to Participant's financial capability to manage such risk.__________

    Exceptions to Participant's written risk policies, procedures and controls applicable to Participant's FTR positions are documented and explain a reasoned basis for the granting of any exception.__________

4. Participant has appropriate personnel resources, operating procedures and technical abilities to promptly and effectively respond to all PJM and PJMSettlement communications and directions.__________

5. Participant has demonstrated compliance with the Minimum Capitalization criteria set forth in Tariff, Attachment Q that are applicable to any PJM Markets in which Participant transacts, and is not aware of any change having occurred or being imminent that would invalidate such compliance.__________

6. All Participants must certify and initial in at least one of the four sections below:

   a. I certify that Participant qualifies as an "appropriate person" as that term is defined under section 4(c)(3), or successor provision, of the Commodity Exchange Act or an "eligible contract participant" as that term is defined under section 1a(18), or successor provision, of the Commodity Exchange Act. I certify that Participant will cease transacting in any PJM Markets and notify PJM and PJMSettlement immediately if Participant no longer qualifies as an "appropriate person" or "eligible contract participant."__________

      If providing audited financial statements, which shall be in US GAAP format or any other format acceptable to PJM, to support Participant's certification of qualification as an "appropriate person:"

      > I certify, to the best of my knowledge and belief, that the audited financial statements provided to PJM and/or PJMSettlement present fairly, pursuant to such disclosures in such audited financial statements, the financial position of Participant as of the date of those audited financial statements. Further, I certify that Participant continues to maintain the minimum $1 million total net worth and/or $5 million total asset levels reflected in these audited financial statements as of the date of this certification. I acknowledge that both PJM and PJMSettlement are relying upon my certification to maintain compliance with federal regulatory requirements.__________

      If not providing audited financial statements to support Participant's certification of qualification as an "appropriate person," Participant certifies that they qualify as an "appropriate person" under one of the entities defined in section 4(c)(3)(A)-(J) of the Commodities Exchange Act. __________

      If providing audited financial statements, which shall be in US GAAP format or any other format acceptable to PJM, to support Participant's certification of qualification as an "eligible contract participant:"

      > I certify, to the best of my knowledge and belief, that the audited financial statements provided to PJM and/or PJMSettlement present fairly, pursuant to such disclosures in such audited financial statements, the financial position of Participant as of the date of those audited financial statements. Further, I certify that Participant continues to maintain the minimum $1 million total net worth and/or $10 million total asset levels reflected in these audited financial statements as of the date of this certification. I acknowledge that both PJM and PJMSettlement are relying upon my certification to maintain compliance with federal regulatory requirements.__________
      >
      > If not providing audited financial statements to support Participant's certification of qualification as an "eligible contract participant," Participant certifies that they

qualify as an "eligible contract participant" under one of the entities defined in section 1a(18)(A) of the Commodities Exchange Act. __________

b. I certify that Participant has provided an unlimited Corporate Guaranty in a form acceptable to PJM as described in Tariff, Attachment Q, section III.D from an issuer that has at least $1 million of total net worth or $5 million of total assets per Participant for which the issuer has issued an unlimited Corporate Guaranty. I also certify, to the best of my knowledge and belief, that the audited financial statements provided to PJM and/or PJMSettlement present fairly, pursuant to such disclosures in such audited financial statements, the financial position of the issuer as of the date of those audited financial statements. Further, I certify that Participant will cease transacting PJM's Markets and notify PJM and PJMSettlement immediately if issuer of the unlimited Corporate Guaranty for Participant no longer has at least $1 million of total net worth or $5 million of total assets per Participant for which the issuer has issued an unlimited Corporate Guaranty.__________

   I certify that the issuer of the unlimited Corporate Guaranty to Participant continues to have at least $1 million of total net worth or $5 million of total assets per Participant for which the issuer has issued an unlimited Corporate Guaranty. I acknowledge that PJM and PJMSettlement are relying upon my certifications to maintain compliance with federal regulatory requirements.__________

c. I certify that Participant fulfills the eligibility requirements of the Commodity Futures Trading Commission exemption order (78 F.R. 19880 – April 2, 2013) by being in the business of at least one of the following in the PJM Region as indicated below (initial those applicable):

   1. Generating electric energy, including Participants that resell physical energy acquired from an entity generating electric energy:__________

   2. Transmitting electric energy:__________

   3. Distributing electric energy delivered under Point-to-Point or Network Integration Transmission Service, including scheduled import, export and wheel through transactions:__________

   4. Other electric energy services that are necessary to support the reliable operation of the transmission system:__________

      Description only if c(4) is initialed:

      ____

   Further, I certify that Participant will cease transacting in any PJM Markets and notify PJM and PJMSettlement immediately if Participant no longer performs at least one of the functions noted above in the PJM Region. I acknowledge that PJM and

PJMSettlement are relying on my certification to maintain compliance with federal energy regulatory requirements.__________

d. I certify that Participant has provided a Letter of Credit of $5 million or more to PJM or PJMSettlement in a form acceptable to PJM and/or PJMSettlement as described in Tariff, Attachment Q, section V.B that the Participant acknowledges cannot be utilized to meet its credit requirements to PJM and PJMSettlement. I acknowledge that PJM and PJMSettlement are relying on the provision of this letter of credit and my certification to maintain compliance with federal regulatory requirements.__________

e. I certify that Participant has provided a surety bond of $5 million or more to PJM or PJMSettlement in a form acceptable to PJM and/or PJMSettlement as described in Tariff, Attachment Q, section V.D. that the Participant acknowledges cannot be utilized to meet its credit requirements to PJM and PJMSettlement. I acknowledge that PJM and PJMSettlement are relying on the provision of this surety bond and my certification to maintain compliance with federal regulatory requirements. __________

7. I acknowledge that I have read and understood the provisions of Tariff, Attachment Q applicable to Participant's business in any PJM Markets, including those provisions describing PJM's Minimum Participation Requirements and the enforcement actions available to PJM and PJMSettlement of a Participant not satisfying those requirements. I acknowledge that the information provided herein is true and accurate to the best of my belief and knowledge after due investigation. In addition, by signing this certification, I acknowledge the potential consequences of making incomplete or false statements in this Certification.__________

Date: ____________________________ ____________________________________

Participant (Signature)

Print Name: ____________________________________

Title: ____________________________________

Attachment C

Affidavit and Exhibits of
Lisa M. Drauschak
on Behalf of PJM Interconnection, L.L.C.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C.	)))	Docket No. ER22-___

AFFIDAVIT OF
LISA M. DRAUSCHAK
ON BEHALF OF PJM INTERCONNECTION, L.L.C.

1. PERSONAL AND PROFESSIONAL QUALIFICATIONS

Q1.1 PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Lisa M. Drauschak. My business address is PJM Interconnection, L.L.C., located at 2750 Monroe Blvd., Audubon, PA 19403.

Q1.2 BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?

A. Since February 2020, I have been Vice President, Chief Financial Officer and Treasurer of PJM Interconnection, L.L.C. ("PJM"). In this capacity, I am responsible for the following functions within PJM: financial reporting, treasury, tax, procurement, member billing, budgeting and forecasting. Since April 2022, I have been the Acting Chief Risk Officer. In this interim capacity, I am responsible for identifying, assessing and helping to mitigate risks across PJM, including implementing and advancing risk management practices in PJM's Financial Transmission Rights ("FTR") market.

Q1.3 PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

A. I joined PJM in July 1999. I was hired as a Sr. Business Analyst performing various financial analysis functions. In March 2000, I was appointed Assistant Controller and was responsible for accounting, financial reporting and accounts payable. In March 2005, I was appointed Controller of PJM, in which position I was responsible for accounting, financial reporting, tax compliance, payroll, accounts payable, financial software support, and coordination of audits performed by PJM's independent auditors. Before joining PJM, I was a senior auditor with PriceWaterhouseCoopers and a manager of forecasts and budgets with Advanta Corporation.

Q1.4 PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I have a Bachelor of Science in accountancy from Villanova University.

2. PURPOSE OF AFFIDAVIT

Q2.1 WHAT IS THE PURPOSE OF YOUR AFFIDAVIT?

A. My affidavit supports PJM's filing to revise its FTR Credit Requirement in this proceeding by: (1) describing the current FTR Credit Requirement; (2) describing the proposed revised FTR Credit Requirement and its components including the historical simulation ("HSIM") model; (3) explaining how the revised FTR Credit Requirement with HSIM is risk reducing compared to the current FTR Credit Requirement; (4) explaining PJM's cost benefit analysis developed in support of HSIM implementation; (5) explaining the impact of the proposed revised FTR Credit Requirement on PJM FTR Participants and Members; and (6) describing the validation of the HSIM model.

3. DESCRIPTION OF THE CURRENT FTR CREDIT REQUIREMENT

Q3.1 PLEASE DESCRIBE THE CURRENT FTR CREDIT REQUIREMENT.

A. The FTR Credit Requirement is defined in PJM's Tariff as the amount of credit that a Participant must provide in order to support the FTR positions that it holds and/or for which it is bidding. The FTR Credit Requirements are calculated and applied separately for each separate customer account.

Q3.2 WHAT ARE THE COMPONENTS OF THE CURRENT FTR CREDIT REQUIREMENT?

A. The five (5) components of the current FTR Credit Requirement calculation are (1) the monthly path-specific requirements (also known as the FTR Historical Values) and any adjustments, if applicable; (2) an undiversified adder of 3x the net negative clearing cost, which is incrementally applied to Participants that have a negative clearing cost in a given month; (3) an application of the 10¢ per MWh volumetric adder that is applied on a monthly basis; (4) an adjustment for Auction Revenue Rights ("ARR") Credits which is currently used as an offset to FTR Credit Requirements and assumed to be guaranteed revenue; and (5) the application of Mark-to-Auction ("MTA"), which is the difference between the original cleared FTR price and the most recent FTR auction price multiplied by the megawatt quantity. Currently, the MTA is only applied if the most recent auction prices indicate that an FTR portfolio is experiencing a loss in forward value. Any gains in the forward values for FTR Participants are excluded. The calculation of the components of the FTR Credit Requirement are order specific.

Q3.3 WHY HAS PJM PROPOSED A REVISED FTR CREDIT REQUIREMENT?

A. PJM has proposed the revised FTR Credit Requirement to implement improved tools to identify and align FTR portfolio risk with appropriate collateral amounts. Notably, PJM plans to include an HSIM model as part of the FTR Credit Requirement.

4. REVISED FTR CREDIT REQUIRMENT

Q4.1 WHAT IS THE CALCULATION AND COMPONENTS OF THE REVISED FTR CREDIT REQUIREMENT?

A. PJM proposes to determine the revised FTR Credit Requirement using the following calculation in the following order (1) the HSIM margin component defined in the proposed changes to the PJM Open Access Transmission Tariff as Initial Margin and is the first step in calculation of the FTR Credit Requirement; (2) application of ARR Credits, if applicable; (3) MTA Value; (4) application of the10¢ per MWh volumetric minimum value and (5) net realized gains and/or losses in the FTR portfolio.

Q4.2 DESCRIBE THE COMPONENTS OF THE REVISED FTR CREDIT CALCULATION AND RATIONALE FOR EACH.

A. PJM proposes to replace the FTR Historical Value per path component of its FTR Credit Requirement with the output of an HSIM model utilizing a 97% confidence interval. Once the HSIM margin component has been determined, the proposed FTR Credit Requirement calculation will then apply any applicable ARR Credits, the MTA valuation and the 10¢ per MWh volumetric minimum value adjustment components of the current FTR Credit Requirement. Finally, the proposed FTR Credit Requirement will apply a separate component to adjust for net realized gains and losses in the FTR portfolio.

Q4.3 WHAT ARE THE OBJECTIVES OF THE PROPOSED REVISED FTR CREDIT REQUIREMENT?

A. PJM developed the HSIM model to more accurately determine the appropriate amount of initial margin for a FTR Participant's portfolio using available historical pricing data from PJM market for FTRs on all paths in PJM. The HSIM model can estimate financial outcomes for any individual FTR Participant's FTR portfolio based on how those FTR positions would have fared under historically observed price changes. PJM will use the HSIM model to determine the first component of the FTR Requirement based upon the market participant's portfolio, and this component will be updated as the portfolio changes with each subsequent auction and will be reflected as a component in portfolio's margin requirement

Q4.4 HOW DOES THE REVISED FTR CREDIT REQUIRMENT IMPROVE PJM'S RISK MANAGEMENT PRACTICES?

A. The proposed FTR Credit Requirement improves PJM's risk management practices in several ways. First, the HSIM margin component of the proposed FTR Credit Requirement employs an HSIM model developed specifically for PJM's FTR market to assess the historic volatility of the portfolio and to better align the amount of collateral posted to PJM by an FTR Market Participant with the risks presented by such portfolio should that FTR Market Participant default on its obligations.

Second, use of an appropriate confidence interval in conjunction with the HSIM model minimizes the chance that the collateral posted by FTR Market Participants will not be adequate to cover potential losses that PJM and its PJM Members would sustain if an FTR Market Participant defaults. Said another way, the confidence interval improves PJM's risk management practice because it reduces the chance that PJM will be "under-collateralized" in the event of an FTR Market Participant default, requiring PJM members to absorb uncollateralized market losses.

Third, by reordering the components of the FTR Credit Requirement calculation, PJM eliminates the potential for an FTR Market Participant having a zero or minimal collateral requirement as its FTR Credit Requirement, which improves risk management.

Last, the adoption of the HSIM model provides better price transparency associated with specific FTR paths increasing PJM's risk management capabilities.

Q4.5 DESCRIBE THE CAPABILITIES OF THE HSIM MODEL.

A. As used for FTR purposes, HSIM is intended to address and mitigate FTR portfolio risk. HSIM is not intended to address counterparty risk. As I discuss below in section 7 of this affidavit, PJM has developed and implemented credit tools to address counterparty risk. See Question.

Q4.6 WHAT FACTORS INFLUENCED PJM'S DECISION TO ADOPT AN HSIM MODEL?

A. PJM's selection of HSIM was influenced by the adoption by the International Swaps Dealers Association ("ISDA") of an HSIM model as part of its methodology for computing initial margin in its industry-leading licensed Standard Initial Margin ("SIMM") methodology. The ISDA SIMM methodology was developed with input from financial institutions and risk managers around the globe to help Market Participants calculate and exchange initial margin to facilitate consistent risk management practices for over-the-counter financial derivatives transactions (including swaps). The ISDA team identified certain criteria that an initial margin model should satisfy:

- Model outputs should be non-procyclical, that is, margin calculations should be a relatively stable risk mitigation tool as applied to an individual Market Participant over time, provided that a Market Participant's portfolio does not change substantially. Market scenarios and models should be updated periodically at the discretion of the risk manager, and phased in where appropriate, so as not to be explicitly linked to increases in market level or volatility.

- Ease of replication, that is, initial margin calculations should be relatively easy to replicate by or for a particular Market Participant, given the same data inputs and portfolio of positions, such that Participants should be able to validate and anticipate the model output.
- Calculation transparency that is, allowing Market Participant’s access to use the model for scenario analysis and thus understand the drivers of the calculation, which builds confidence in market risk management and enables effective dispute resolution.
- The model should include a robust set of data points, and be able to calculate initial margin quickly, as well as to re-run and validate the calculations to enable more efficient management of the margining process.
- The model should be adaptable, designed to accommodate incremental changes as more data becomes available and back-testing is performed, such that it is easy for the risk manager to add data points, default scenarios or risk factors, if appropriate or as required by regulators.
- The model output should be predictable, enabling Market Participants to accurately price transactions and manage portfolios responsibly, as well as prudently allocate working capital to margining the risks of a specific transaction or an aggregated portfolio of positions.

- Use of the model with large portfolios should not result in significant over- or under-collateralization of risk, in that a portfolio's size or volume metrics are not necessarily correlated with the risk the portfolio represents, and the model should enable inclusion of risk factor offsets where appropriate.

The current model used to calculate the FTR Historical price per path component uses a limited amount of historical data to calculate initial margin incorporating into the analysis pricing data from the immediately preceding three years. Limiting historical data to three years may not take into consideration earlier periods of pricing volatility on some or all of the FTR paths, thereby resulting in the potential for under-collateralization.

Q4.7 WHY IS THE UNDIVERSIFIED ADDER BEING REMOVED FROM THE FTR CREDIT REQUIRMENT?

A. PJM proposes to remove the undiversified adder component of the FTR Credit Requirement because the independent report prepared in the wake of the FTR default by GreenHat Energy LLC[1] determined, and PJM's analysis confirms, that the undiversified adder is not correlated to risk. PJM's back-testing further demonstrated that the undiversified adder component was not correlated to FTR portfolio path. The proposed HSIM model will use available historical FTR pricing data commencing in 2008 to model price volatility per path, and use that data to determine HSIM margin component on a portfolio basis.

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[1] *See* Robert Anderson et al., *Report of the Independent Consultants on the Green Hat Default*, PJM Interconnection, L.L.C. (Mar. 26, 2019), https://www.pjm.com/-/media/library/reports-notices/special-reports/2019/report-of-the-independent-consultants-on-the-greenhat-default.ashx?la=en.

Q4.8 HOW DOES THE CONFIDENCE INTERVAL APPLIED TO THE HSIM MODEL'S CALCULATION OF INITIAL MARGIN WORK AS A RISK MANAGEMENT TOOL TO PROTECT PJM AND ITS MEMBERS FROM AN UNDER-COLLATERALIZED DEFAULT SCENARIO IN THE FTR MARKETS?

A. The confidence interval reflects the statistical measure of confidence that the initial margin posted by an FTR Market Participant will "cover" potential market losses that would result from such FTR Market Participant's default, over the time period during which it is expected that the Market Participant's portfolio can be liquidated. This liquidation time period is also referred to as the coverage period or the "Margin Period of Risk" which, for PJM's FTR markets, has been determined and approved by the Federal Energy Regulatory Commission to be two FTR auction periods. The confidence interval is expressed as a percentage, and the higher the percentage the more confident the risk manager is that the initial margin collected will be adequate to cover the potential market loss if an FTR Market Participant defaults. Another way of looking at the confidence interval is as a measure of confidence that the market will not be "under-collateralized" for the risks represented by the FTR portfolio. The higher the confidence level the more risk protection, however because a 97% confidence interval also implies that in about 3% of cases the required initial margin will be less than the portfolio's loss over the margin period of risk.

Q4.9 WHAT ARE THE OTHER PROPOSED CHANGES TO THE FTR CREDIT REQUIREMENT, AND WHAT IS THE REASONING FOR SUCH CHANGES?

A. While we are not changing the ARR Credit component, we are proposing to bring it forward in the calculation of the FTR Credit Requirement. The ARR Credit component, if applicable, will be applied as an offset to the FTR Credit Requirement.

Q4.10 WHAT CHANGES ARE BEING MADE TO THE MARK-TO-AUCTION COMPONENT OF THE FTR CREDIT REQUIRMENT?

A. The MTA component of the FTR Credit Requirement will now be applied on a net basis. Currently, pricing data from later auctions is used to make an MTA adjustment only when it results in an increase to the FTR Credit Requirement due to a loss in portfolio value.

Q4.11 WHAT IS THE PURPOSE OF THE VOLUMETRIC MINIMUM?

A. Applying the 10¢ per MWh volumetric minimum will serve as a floor value to represent a minimum collateral amount. This is done by comparing the results of the HSM margin component, less the ARR and MTA credits, against the 10¢ per MWh volumetric minimum and taking the maximum value as the result. The volumetric minimum ensures that all FTR Participants are posting collateral which results in enhanced FTR default protection to the PJM Members.

Q4.12 HOW ARE REALIZED GAINS AND LOSSES INCLUDED IN THE REVISED FTR CREDIT REQUIRMENT?

A. The revised FTR Credit Requirement applies a separate component to adjust the margin level for net realized gains and loss in the FTR portfolio to ensure that any net realized values have appropriate margin held for them until paid.

<u>5. HOW HSIM IS RISK REDUCING</u>

Q5.1 WILL PJM'S PROPOSED USE OF THE HSIM MODEL REDUCE RISK FOR PJM AND ITS MEMBERS?

A. Yes. By requiring margin that is sufficient to cover the wide range of possible portfolio losses simulated from the greatly expanded set of historic market data, the

HSIM model substantially reduces both i) the risk that actual portfolio losses will exceed the margin; and ii) the overall dollar amount by which portfolio losses exceed the margin, which reduces the risk of payment defaults due to FTR portfolio losses. PJM performed back-testing to confirm that HSIM is in fact risk reducing. As explained by Dr. Eydeland in his accompanying affidavit, back-testing is a standard manner for validating a trading or risk management methodology using historical data. In this case, PJM back tested the HSIM model using historical data from the February 2022 and March 2022 FTR auctions. The results of PJM's back-testing confirmed that, as intended, the HSIM model reduces the risk that portfolio losses will exceed the required margin, and reduces the extent of those exceedances.

Q5.2 PLEASE EXPLAIN HOW PJM USED BACK-TESTING TO CONFIRM HSIM REDUCES RISK.

A. PJM performed back-testing to validate the HSIM model. PJM's back-testing involved (1) comparing forward market prices to actual historical FTR monthly and long term auction data to determine portfolio gain or loss for a given FTR portfolio; (2) using HSIM margin component and comparing those values to the back test gain or loss; and (3) determining the shortfall or failure rate for each portfolio. Dr. Eydeland explains how back-testing validates the model by assessing whether the model results in a failure rate (i.e., around 3%) that is consistent with the chosen confidence interval (i.e., 97%). As he notes, back-testing did validate that key aspect of the model. But the back-testing also allows comparison of the failure rate and shortfall between different scenarios, such as comparing the proposed HSIM model results against the failure rate and shortfall associated with the status quo. The back-testing I describe here compared the failure rate and shortfall that actually resulted from PJM's February 2022 and March 2022 FTR auctions against the failure rate and shortfall that would have resulted if the revised FTR Credit Requirement, with its proposed HSIM model, had been in effect.

Q5.3 WHAT IS THE FAILURE RATE AND THE SHORTFALL?

A. The failure rate is the number of instances in which the projected FTR portfolio losses exceed the margin required for an FTR portfolio. The shortfall refers to the amount by which the portfolio loss exceeds the required margin.

Q5.4 WHAT WERE THE RESULTS OF PJM'S BACK-TESTING?

A. The results are shown in Exhibit A to my affidavit. As can be seen, the HSIM model would have resulted in a much smaller failure rate and shortfall from the February 2022 auction than what actually resulted from that auction under the status quo FTR Credit Requirement. Specifically, the HSIM model would have reduced the failure rate from 11.7% (under the status quo) to 3.6% (under the HSIM model using a 97% confidence interval). The HSIM model also would have reduced the shortfall from $41.7 million (under the status quo) to $2.3 million (under the HSIM model using a 97% confidence interval). Back-testing using the March 2022 auction yields similarly large reductions in risk. The HSIM model would have reduced the failure rate from 11.3% (under the status quo) to 3.0% (under the HSIM model using a 97% confidence interval). The HSIM model also would have reduced the shortfall from $3.1 million (under the status quo) to $0.6 million (under the HSIM model using a 97% confidence interval). Thus, the failure rate would have been reduced by over 69% and over 73% from the February and March auctions, respectively, while the shortfalls would have been reduced by over 94% and over 80%, respectively.

Q5.5 WHAT DID THE BACK-TESTING REVEAL ABOUT THE AGGREGATE COLLATERAL LEVELS REQUIRED BY THE HSIM MODEL COMPARED TO THE STATUS QUO?

A. The back-testing revealed that the HSIM model would have produced the dramatic reductions in both the failure rate and the shortfall described in my answer to Q5.4 even though the revised FTR Credit Requirement would have required a lower overall amount of collateral than the status quo rules actually required.. Specifically, as also shown on Exhibit A, the back-testing of the February 2022 FTR auction determined the collateral required under the revised FTR Credit Requirement using the HSIM model at a 97% confidence interval would have been about $448 million lower than that required by the status quo rules, representing a 26% reduction in required collateral. Similarly, the back-testing of the March FTR 2022 auction determined the collateral required under the revised FTR Credit Requirement would have been about $619 million lower than that required by the status quo rules, representing a 39% reduction in required collateral. This collateral comparison underscores that what matters most in an effective collateral requirement is not its overall collateral level but how well the collateral requirement is correlated with risk and how well it reduces risk. The revised FTR Credit Requirement does a far better job than the status quo rules of tailoring the collateral required to protect against FTR portfolio losses to the risk of loss actually presented by each FTR portfolio.

6. COST/BENEFIT ANALYSIS

Q6.1 HAS PJM EVALUATED THE RELATIVE COSTS AND BENEFITS OF USING DIFFERENT **CONFIDENCE INTERVALS IN THE HSIM MODEL AND, IF SO, WHY?**

A. Yes. The Commission on February 28, 2022 rejected PJM's previous filing of the revised FTR Credit Requirement on the grounds that PJM had not sufficiently supported its proposal to use a 97% confidence interval in the HSIM model. PJM had presented what it thought was sufficient evidence to show that the proposal, including the 97% confidence interval, was reasonable, but PJM had not focused on providing substantial evidence for why it was *not* using a 99% confidence interval. PJM's initial meetings with stakeholders after that Commission action revealed strong support for an assessment of the comparative costs and benefits of using a 97% or 99% confidence interval, and PJM agreed that such an analysis was warranted under the current circumstances. Accordingly, PJM performed a cost benefit analysis and shared it with Members at a Special Members Committee meeting on April 14, 2022.

Q6.2 CAN YOU PROVIDE AN OVERVIEW OF PJM'S APPROACH TO THIS COST/BENEFIT QUESTION?

A. Using a higher confidence interval in the HSIM model will increase the margin required by the HSIM model, since the higher interval requires the model to capture more extreme scenarios. That increased collateral imposes an increased financial cost on the FTR Participant that must provide the collateral. This cost is real even if the Participant uses its own internal funds, which has time value when it is deployed as collateral instead of for other business purposes. But the higher confidence interval also provides a benefit because by design it should reduce the number of instances and extent of portfolio losses exceeding the required margin. Reducing that shortfall should also reduce the likelihood and extent of payment defaults that are due to FTR portfolio losses. Because the costs of payment defaults are socialized among PJM Members, PJM Members receive a benefit to the extent they avoid such costs. These are the costs and benefits PJM in its analysis, comparing the incremental costs, and incremental benefits from using a 99% confidence interval instead of a 97% confidence interval. For this purpose, PJM used back-testing analyses completed last year that PJM had relied on for presentations to stakeholders on the effects of different confidence intervals. PJM's back-testing from the February and March 2022 auctions, which I described above, was conducted after PJM performed the subject cost/benefit analysis.

Q6.3 PLEASE PROVIDE MORE DETAIL ON THE COST COMPONENT PJM USED IN ITS COST/BENEFIT ANALYSIS.

A. The cost component of the analysis represents an estimate of the cost of capital for PJM FTR Participants to provide the additional margin required by a 99% confidence interval. Because FTR Participants have varying cost of capital, PJM developed both a low and high estimate of the cost of capital. The low estimate was based upon an average of the London Interbank Offer Rate ("LIBOR") 6-month and 12-month published rates, as of March 25, 2022, plus a spread, taken from bank lending data, based on the varied credit ratings among FTR Market Participants. The high estimate of the cost of capital employed a flat rate of 8%.

Q6.4 WHAT FACTORS DID PJM CONSIDER WHEN DETERMINING THE LOW AND HIGH ESTIMATES OF THE COST OF CAPITAL?

A. The financial cost to maintain collateral primarily depends on prevailing interest rates, and 6-month and 12-month LIBOR rates provide a reasonable metric for the relevant prevailing interest rates. Interest rates, as is well known, are currently trending up. In fact, the average of 6-month and 12-month LIBOR rates is now about 60 basis points higher than it was when PJM prepared the cost/ benefit analysis presented here. The 8% rate was selected to provide a reasonable amount of range above the lower interest cost estimate described above, so as to leave some room for varied financial circumstances of FTR Participants.

Q6.5 PLEASE EXPLAIN THE BENEFIT COMPONENT PJM USED IN ITS COST/BENEFIT ANALYSIS.

A. As I explained above, the benefit of a higher confidence interval is the costs Members avoid because the higher confidence interval reduced payment defaults that result from FTR portfolio losses. For this purpose, PJM's back-testing compared the shortfalls resulting from the HSIM model with a 99% confidence interval and the shortfalls resulting from the HSIM model with a 97% confidence interval. PJM then needed to translate those shortfalls into FTR Participant payment defaults. That relationship is inherently hard to predict. But it is safe to say that shortfalls, i.e., the dollar amount by which portfolio losses over the margin period of risk exceed the collateral collected by the FTF Credit Requirement, are much more common than payment defaults. As I noted above, the status quo rules resulted in shortfalls of 11% and 11.7% from the February 2022 and March 2022 auctions; and PJM noted an 8% shortfall rate from the status quo rules in its analysis last year. FTR payment defaults, by contrast, are infrequent, although, because PJM strives to avoid any payment defaults, each one that occurs is highly notable. To reflect the generally low incidence and extent of payment defaults relative to FTR payment defaults, PJM used both a 5% and 10% factor to relate default amounts to shortfall amounts. Given the inherent uncertainty in this relationship, PJM also calculated the percentage for this factor at which a net benefit would become a net cost. For this cost/benefit analysis that derived factor was 81%—which is far above any relation between shortfalls and payment defaults PJM has experienced to date. Last, as the final step in identifying the default costs Members would avoid as a result of using a 99% confidence interval, PJM applied the Default Allocation Assessment factors prescribed by its Operating Agreement to the specified metrics for each Member as of January 2022.

Q6.6 WHAT DID PJM'S COST BENFIT ANALYSIS REVEAL REGARDING FTR PARTICPANT'S COST OF CAPITAL UNDER THE REVISED FTR CREDIT REQUIREMENT UNDER CONFIDENCE INTERVAL 99% AND CONFIDENCE INTERVAL 97%?

A. These results are shown in Exhibit B to my affidavit. The first page of Exhibit B shows the increase in collateral, on a dollar and percentage basis, when using a 99% confidence interval instead of a 97% confidence interval. Page 2 of that exhibit shows the increase in the cost of capital for that collateral, on a dollar and percentage basis, for both the lower-cost and higher-cost interest scenarios, when using a 99% confidence interval instead of a 97% confidence interval. As can be seen, PJM's analysis calculated that FTR Market Participants would incur an additional $22.5 million under the low cost estimate of cost of capital and incur an additional $46.8 million using the high estimate of cost of capital, if the revised FTR Credit Requirement used a 99% confidence interval instead of a 97% confidence interval.

Q6.7 WHAT DID PJM'S COST BENFIT ANALYSIS REVEAL REGARDING THE BENEFITS TO FTR PARTICPANT'S FROM EMPLOYING THE REVISED FTR CREDIT REQUIREMENT UNDER CONFIDENCE INTERVAL 99% AND CONFIDENCE INTERVAL 97%?

A. This is discussed and shown in Exhibit C to my affidavit. As noted on page 1 of that exhibit, comparing the shortfall amounts resulting from last year's back-testing of the HSIM model with the two different confidence intervals, PJM determined that the HSIM model employing a 97% confidence interval resulted in an additional yearly shortfall of $27.5 million when compared to the HSIM model employing a 99% confidence interval. Page 2 of Exhibit C then lays out the three different default rates, i.e., 5%, 10%, and 81%, that I discussed above.

Q6.8 WHAT DID THE COST/BENEFIT ANALYSIS FIND AS TO THE COSTS AND BENEFITS FOR PJM MEMBERS AS A WHOLE?

A. This is shown on Exhibit D to my affidavit. As can be seen, the overall benefit to Members at a 5% default rate was $ 1.4 million, while the overall benefit to Members at a 10% default rate was $ 2.7 million. By contrast, the cost to Members using the lower interest rate assumption was $22.4 million, while the cost to Members using the higher interest rate assumption was $ 46.8 million. Thus, it appears the costs to Members of using a 99% confidence interval (rather than a 97% confidence interval) in the HSIM significantly exceed the benefit to Members from using the higher confidence interval. As I previously noted, PJM also calculated the default rate that would have to prevail for the benefits to exceed the costs, and found that break-even rate would have to be 81%. Note that this assumes the lower-interest cost of capital. The default rate would have to be 100% or above with even a moderately higher cost of capital. Note, too, as I observed above, that even the lower-cost estimate of the cost of capital is currently about 60 basis points higher than is assumed in the results shown on Exhibit D.

Q6.9 DID PJM EVALUATE THE SECTOR IMPACT OF INCREASED COLLATERAL LEVELS AT HSIM CONFIDENCE INTERVAL 99% VERSUS 97%?

A. Yes. PJM's analysis included an estimation of the collateral financing costs as well as the default allocation avoidance benefits for the various sectors within PJM's membership. Exhibit D also shows the results of this analysis. The sectors evaluated included the End Use Customers, Electric Distributors, Generation Owners and Other Suppliers. The Other Supplier category was further divided into Load Serving Entities, Financial Traders and remaining Other Suppliers in order to observe and evaluate the impact of the confidence interval among sectors.

Q6.10 PLEASE EXPLAIN WHAT THE COST BENEFITS ANALYSIS REVEALED REGARDING THE IMPACT TO PJM MEMBERS BY SECTOR.

A. The cost benefit analysis determined that for every PJM Member sector, the collateral costs of using a 99% confidence interval exceeded the benefits of using the 99% confidence interval (compared to use of a 97% confidence interval in the HSIM model). Further, the use of a 99% confidence interval results in a 48% increase in required collateral from all sectors.

Q6.11 PLEASE EXPLAIN WHAT THE COST/BENEFIT ANALYSIS REVEALED REGARDING THE IMPACT TO MEMBERS THAT SERVE LOAD.

A. The cost/benefit analysis showed that FTR Participants that serve load are disproportionately impacted by the use of the 99% confidence interval. In fact, every sector that includes Members that serve load experiences an above-average percentage increase in their collateral requirement from using the 99% confidence interval when compared to 97%. The subset of PJM's Members that identify themselves as load serving entities see a 53% increase, in their required collateral, from using a 99% confidence interval. Others sectors that serve load including Electric Distributor, Generation Owner and Transmission Owner experience even higher increases in their required collateral as a result of the 99% confidence interval. Their increases are 57.5%, 63% and 114.1% respectively.

Q6.12 PLEASE EXPLAIN WHAT THE COST BENEFITS ANALYSIS REVEALED REGARDING THE IMPACT TO MEMBERS THAT DO NOT SERVE LOAD.

A. PJM Members that do not serve load experience below-average increases in their collateral requirement as a result of the employment of a 99% confidence interval. More specifically, PJM Member's within the Other Supplier sector that self-identify as Financial Traders, and a residual group of Other Suppliers generally comprised of power marketers, see collateral requirement increases of 38.3% and 46.9% respectively, as a result of using the 99% confidence interval.

7. IMPACT OF THE REVISED FTR CREDIT REQUIREMENT

Q7.1 WHAT IS THE EFFECT OF THE REVISED FTR CREDIT ON THE MARGIN REQUIRED FROM FTR PARTICIPANTS?

A. The impact on FTR Participant's margin will vary depending on the FTR Participant's FTR portfolio risk. In general, Participants with well-balanced FTR portfolios, that include offsetting flows and counter flow FTR paths, could experience reductions in their FTR Credit Requirement. Likewise, FTR portfolios that are not diversified and do not have offsetting FTR paths could experience an increase in their FTR Credit Requirement. The primary factor that influences the margin required by the HSIM model is the risk inherent in a FTR Participant's FTR portfolio.

Q7.2 HOW DOES THE REVISED FTR CREDIT REQUIREMENT BETTER PROTECT PJM'S MARKETS AND MEMBERS FROM THE RISKS PRESENTED BY THE FTR MARKETS?

A. The PJM membership as a whole will be better protected against potential losses caused by defaults by FTR Participants. The revised FTR Credit Requirements will better align collateral requirements with risks in the FTR market. The revised FTR Credit Requirement improves PJM's risk management practices by enabling better estimates of the potential risk of market losses that would be borne by and allocated among PJM Members.

Q7.3 DOES THE FTR CREDIT REQUIRMENT AT CONFIDENCE INTERVAL 97% IMPROPERLY EXPOSE THE ENTIRE PJM MEMBERSHIP TO DEFAULT COSTS?

A. As I showed above in Part 5 of this affidavit, the revised FTR Credit Requirement using a 97% confidence interval is risk reducing as compared to the status quo. PJM cannot completely eliminate the risk of default in forward markets. The HSIM component of the FTR Credit Requirement improves the allocation and correlation of risk and consequently, collateral to the FTR paths that have historically displayed the most price volatility.

Q7.4 DOES REVISED FTR CREDIT REQUIRMENT AT HSIM CONFIDENCE INTERVAL 97% CAUSE MARKET PARTICIPANTS TO COLLATERALIZE FOR FTR MARKET PARTICPANTS WHO SHOULD ABSORB THE RISK?

A. No. Under HSIM, the use of the historical price volatility per path is designed to allocate collateral to those paths. Consequently, FTR paths that historically displayed less volatility will demand less collateral while the FTR paths that contain more volatility will require more collateral under HSIM.

Q7.5 WILL THE REVISED FTR CREDIT REQUIREMENT PREVENT PARTIES FROM PARTICIPATING IN THE PJM FTR MARKET?

A. No, the revised FTR Credit Requirement will not prevent parties from participating in the PJM FTR market, it will only better reflect the risks presented by the particular FTR paths they choose to obtain in the auctions. This is consistent with current practices. Additionally, PJM anticipates that some FTR Market Participants will modify their FTR trading strategy as a means of lowering their FTR Credit Requirement.

Q7.6 WILL THE IMPLEMENTATION OF HSIM CONFIDENCE INTERVAL 97% CAUSE FTR PARTICIPANTS TO UNWIND THEIR POSITIONS?

A. No, as mentioned in Q7.11 below, FTR Participants will have available the notice provided by this filing as well as the opportunity to determine their prospective FTR Credit Requirement using tools available on FTR Center on PJM's website.

Q7.7 WHY DOES THE REVISED FTR CREDIT REQUIRMENT WITH HSIM CONFIDENCE INTERVAL 97% REQUIRE LOWER OVERALL COLLATERAL LEVELS THAN THE STATUS QUO?

A. In response to concern the Commission expressed in its February 28, 2022 order about impacts on overall collateral, and to further satisfy itself that the revised FTR Credit Requirement is risk reducing, PJM analyzed which components of the revised FTR Credit Requirement are most responsible for the reduction in required collateral compared to the status quo. For its analysis, PJM looked at the collateral that each major component of the revised FTR Credit Requirement would have required in the February 2022 and March 2022 FTR auctions, as compared to the collateral actually required in those auctions by the status quo rules. The results of

PJM's analysis are shown in Exhibit E to my affidavit. As can be seen, the reduction in collateral is *not* driven by the use of HSIM with a 97% confidence interval. Rather, very large reductions in collateral result from two other components of the revised FTR Credit Requirement: i) elimination of the undiversified adder; and ii) allowing MTA adjustments to reduce (instead of only increase) the FTR Credit Requirement. Despite their collateral-reduction effects, both of these Tariff changes are reasonable, as I explained in section 4 of my affidavit. Indeed, what this analysis underscores is that the current Tariff rules on these two factors are not well representative of portfolio risk, because the revised FTR Credit Requirement dramatically reduces both the failure rate and the shortfall relative to the status quo—which are the direct indications of the risks from portfolio losses.

Q7.8 HOW IS THE REVISED FTR CREDIT REQUIRMENT AND HSIM CALIBRATED TO ENSURE THAT MARKET PARTICIPANTS WILL BE REQUIRED TO PROVIDE ADEQUATE COLLATERAL RELATIVE TO THE RISK OF THEIR POSITIONS?

A. As explained in Q5.4 above, PJM's back-testing analysis has determined that the Revised FTR Credit Requirement is better tailored than the status quo to protect against the risk of portfolio losses.

Q7.9 WILL THE REVISED FTR CREDIT REQUIRMENT PROVIDE ADEQUATE MARGIN FOR THE RISKIEST OF FTR COUNTERPARTIES?

A. The revised FTR Credit Requirement and HSIM is not intended to address counterparty risk. The FTR Credit Requirement is designed to more accurately measure and protect against portfolio risk. PJM has other credit tools that it can employ to address counter party risk.

Q7.10 WHAT CREDIT TOOLS MAY PJM EMPLOY TO ADDRESS COUNTERPARTY RISK?

A. Some of the tools that PJM currently has available to address counterparty risk include Know Your Customer reforms, restricted timelines for collateral call payments, enhanced material adverse change language, required audited financials, the implementation of financial models, the addition of unreasonable credit risk as a basis for collateral calls, and the ability to limit and suspend market participation.

Q7.11 HOW DOES PJM PLAN TO IMPLEMENT THE REVISED FTR CREDIT REQUIREMENT?

A. PJM is currently operating a parallel process in PJM's eCredit and FTR center to allow FTR Participants to see their total FTR Credit Requirement under both status quo and the proposed HSIM methodology and to continue to use PJM's tools which currently permit FTR Participants to perform scenarios to determine their FTR Credit Requirement.

Q7.12 WHEN DOES PJM PLAN TO IMPLEMENT THE REVISED FTR CREDIT REQUIREMENT AND WHY?

A. PJM plans to have the revised FTR Credit Requirement effective sixty days from the date of this filing.

8. VALIDATION OF THE HSIM MODEL

Q8.1 HAS THE HSIM MODEL BEEN VALIDATED?

A. Yes. PJM has recently engaged KPMG to perform a validation of the model.

Q8.2 PLEASE DESCRIBE THE VALIDATION PROCESS?

A. The validation process involves a 4 step review of the HSIM model. The steps are follows: (1) evaluation of the model conceptual soundness and developmental evidence; (2) evaluation of model testing procedures and results; (3) evaluation of model monitoring and testing plan; and (4) comparison of modeling framework with industry leading practices. The model is tested to determine whether the model operates as intended. The validation of the model is independent of a particular confidence interval.

Q8.3 HAS THE HSIM MODEL BEEN VALIDATED AT CONFIDENCE INTERVAL 97%?

A. In support of this filing, PJM requested KPMG to validate the HSIM model at confidence interval 97%. The validation, as shown in Exhibit F to my affidavit, concluded that the model was implemented as documented.

Q8.4 DOES THIS CONCLUDE YOUR AFFIDAVIT?

A. Yes.

Exhibit A

Backtesting of February 2022 FTR Auction

Dollars in millions	Credit Requirement	Failure Rate[1]	Shortfall
97% CI	$1,256.6	3.6%	$2.3
Status Quo	$1,705.1	11.7%	$41.7

1. Failure Rate is based on instances of failure across the FTR portfolio.
    - 97% CI: 11 failures over 308 portfolios
    - Status Quo: 36 failures over 308 portfolios

Backtesting of March 2022 Auction

Dollars in millions	Credit Requirement	Failure Rate[1]	Shortfall
97% CI	$968.5	3.0%	$0.6
Status Quo	$1,587.5	11.3%	$3.1

1. Failure Rate is based on instances of failure across the FTR portfolio.
    - 97% CI: 9 failures over 301 portfolios
    - Status Quo: 34 failures over 301 portfolios

Exhibit B

Change in Required Collateral

Dollars in millions	Collateral – 97% CI ♦	Collateral – 99% CI ♦	**$ Change** Moving From 97% CI to 99% CI♦	**% Change** Moving From 97% CI to 99% CI♦
Electric Distributor	$46.4	$73.1	$26.7	57.5%
Generation Owner	$104.6	$170.5	$65.9	63.0%
Transmission Owner	$43.4	$92.9	$49.5	114.1%
Other Supplier ●	$1,026.2	$1,469.4	$443.2	43.2%
Load Serving Entity	$180.5	$280.3	$99.8	55.3%
Financial Trader	$619.0	$856.0	$237.0	38.3%
Other Supplier	$226.7	$333.1	$106.4	46.9%
Total ■	**$1,220.6**	**$1,805.9**	**$585.3**	**48.0%**

♦	Confidence interval
■	Data utilized for the FTR Credit Filing at FERC (December 2021).
●	Line of business based on member self-identification in membership records.

Electric Distributors and Transmission Owners serve a significant amount of load as well as some Generation Owners.

Estimated Cost of Capital

Dollars in millions	Collateral – 97% CI ♦	Collateral – 99% CI ♦	Low Rate Estimated Cost of Capital 97% CI to 99% CI ♦	High Rate Estimated Cost of Capital 97% CI to 99% CI ♦
Electric Distributor	$46.4	$73.1	$0.9	$2.1
Generation Owner	$104.6	$170.5	$2.9	$5.3
Transmission Owner	$43.4	$92.9	$1.6	$3.9
Other Supplier ●	$1,026.2	$1,469.4	$17.1	$35.5
Load Serving Entity	$180.5	$280.3	$3.7	$8.0
Financial Trader	$619.0	$856.0	$9.5	$19.0
Other Supplier	$226.7	$333.1	$3.9	$8.5
Total ■	**$1,220.6**	**$1,805.9**	**$22.5**	**$46.8**

♦	Confidence interval
■	Data utilized for the FTR Credit Filing at FERC (December 2021).
●	Line of business based on member self-identification in membership records.

Electric Distributors and Transmission Owners serve a significant amount of load as well as some Generation Owners.

Exhibit C

Defaults were calculated using the shortfall from back testing previously shared with members.

Movement from a 99% CI to a 97% CI resulted in an average incremental yearly shortfall of $27.5 M.	Probability of financial default was calculated using different levels.

Those defaults were then assigned to each member using default allocation assessment percentages calculated as of January 2022 and will change over time.

Default Rate Assumptions

Moving from a 99% CI to a 97% CI increases the incremental annual shortfall by $27.5 million.
It is difficult to determine, with accuracy, how much of that shortfall would result in financial defaults.

PJM chose three data points to calculate a range:	5%
	10%
	81% – Break even at the low rate (Where cost approximates benefit in total)

Exhibit D

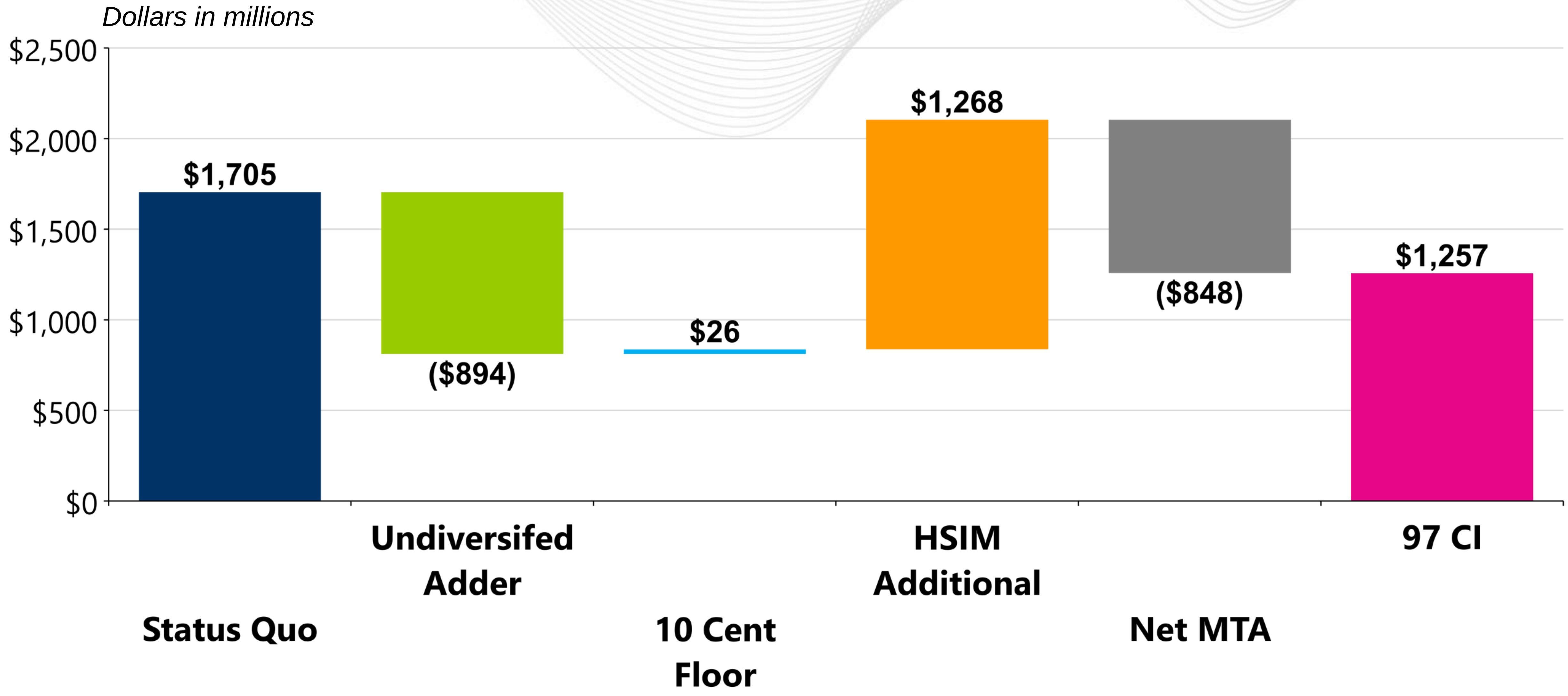
Estimated Cost vs. Benefit Analysis

Dollars in millions	Low Rate Estimated Cost of Capital Moving From 97% to 99% CI	High Rate Estimated Cost of Capital Moving From 97% to 99% CI	Default Rate♦ 5% Sum of Improved Member Default Coverage across all Market Participants	Default Rate♦ 10%	Default Rate♦ 81%
End-Use Customer	$ -	$ -	$ -	$ -	$0.1
Electric Distributor	$0.9	$2.1	$ -	$0.2	$1.2
Generation Owner	$2.8	$5.3	$0.3	$0.6	$5.0
Transmission Owner	$1.6	$4.0	$0.3	$0.5	$4.6
Other Supplier	$17.1	$35.4	$0.8	$1.4	$11.5
Load Serving Entity	$3.7	$8.0	$0.4	$0.8	$6.2
Financial Trader	$9.5	$18.9	$0.1	$0.1	$1.1
Other Supplier	$3.9	$8.5	$0.3	$0.5	$4.2
Total	**$22.4**	**$46.8**	**$1.4**	**$2.7**	**$22.4**

♦ Default rate allocations as of January 2022

Exhibit E

Status Quo – HSIM 97% CI – February 2022 Collateral



Status Quo – HSIM 97% CI – March 2022 Collateral

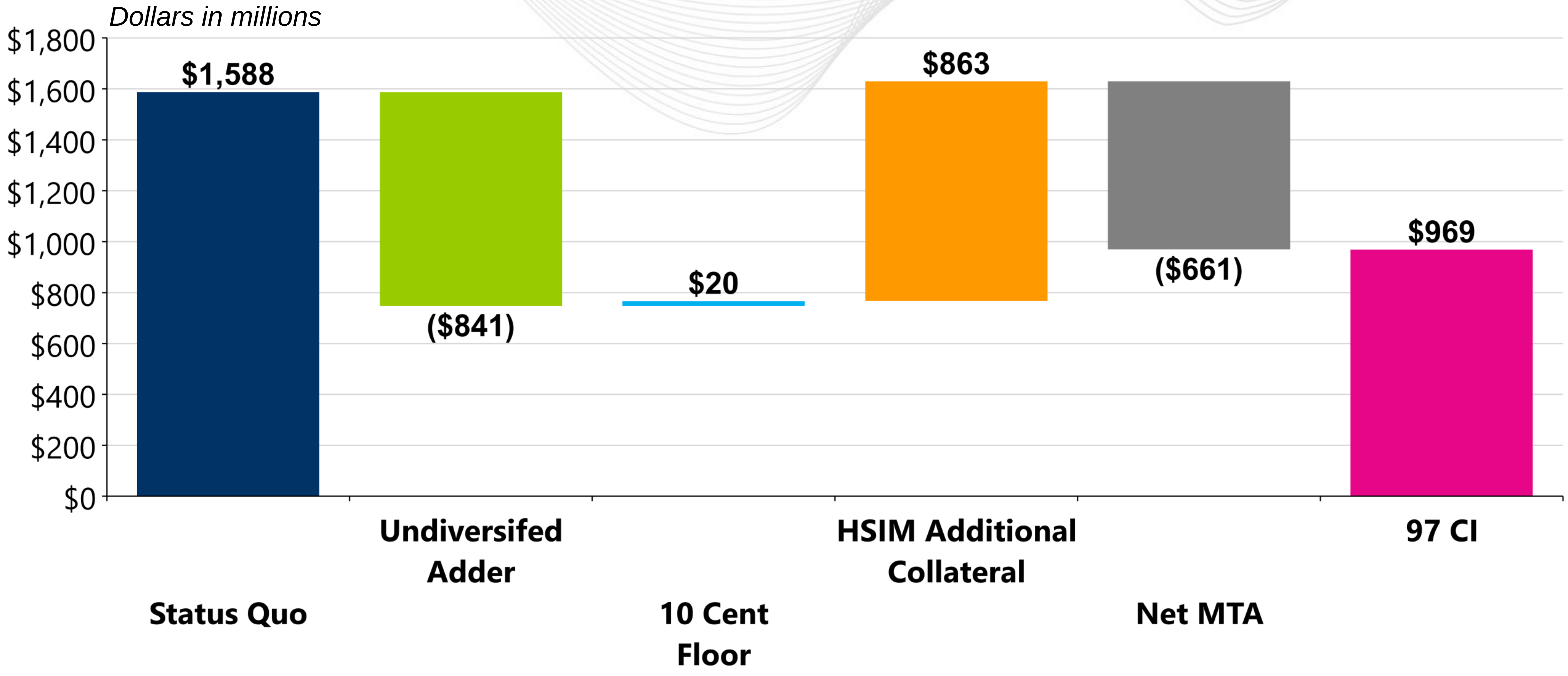


Exhibit F

Initial Margin Validation Report. Executive Summary

In the course of this engagement, KPMG validated the Initial Margin model to be employed by PJM. The model is based on Value-at-Risk (VaR) type calculation which is often used by clearing counterparties (CCP) and brokers for initial margin calculations.

Model Documentation

The Model owner documentation prepared by the Model developer is extensive and detailed. It has the definitions of all the terms, and detailed description of most of the procedures. However some details were not included. Follow up questions and interviews with the Model developers and Model users were needed obtain a clear understanding of the model details.

Implementation

The review of the MATLAB prototype and SAS production codes showed that the model was implemented as documented.

Backtesting

Backtesting is a standard method for validating a trading or risk management methodology. The back-testing procedure is described as follows.

- Fix FTR portfolios (covering 307 participants in total) at time t in the past, called the measurement date
- Calculate IM using historical data prior to the measurement date
- Assume that a default happens at time t and it takes a time period (1 month, 2 months, or up to the settlement) to unwind the position. Calculate the actual price move of the fixed portfolio over that period
- Compare the actual move during the liquidation period with the computed IM. Save the breach rate, percentage of times the actual loss was more severe than IM.
- Repeat this test for various measurement dates (38 measurement dates ranging from February 2016 to April 2020), for monthly and long-term auctions, for large group of participants.

The overall results have demonstrated that the IM methodology historically behaves as expected under 95%, 97%, and 99% confidence intervals.

Substitute Nodes (Backfilling)

The IM is based on historical VaR calculation for each FTR path. However, as new nodes are added to the grid, there may not be sufficient statistics for the VaR. PJM finds a substitute node based on geographic and impedance proximity, whose history is then used for the VaR calculation. Regression analysis, performed for the target and substitute nodes for the time periods where both data sets are available, support the choice of the substitute nodes. PJM is currently incorporating the regression analysis into substitute node selection process.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C.	)))	**Docket No. ER22-____-000**

VERIFICATION

Lisa M. Drauschak, being first duly sworn, deposes and states that she is the Lisa M. Drauschak referred to in the foregoing document entitled "Affidavit of Lisa M. Drauschak on Behalf of PJM Interconnection, L.L.C." that she has read the same and is familiar with the contents thereof, and that the facts set forth therein are true and correct to the best of her knowledge, information, and belief.

/s/ Lisa Drauschak
Lisa M. Drauschak
Vice President, Chief Financial Officer and Treasurer
PJM Interconnection, L.L.C.

Kathleen Lauren McGarry 06/03/2022

Commonwealth of Pennsylvania - Notary Seal
KATHLEEN LAUREN MCGARRY - Notary Public
Montgomery County
My Commission Expires December 18, 2022
Commission Number 1287442

Attachment D

Affidavit of Dr. Alex Eydeland
on Behalf of PJM Interconnection, L.L.C.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C.	)))	Docket No. ER22-___

AFFIDAVIT OF
DR. ALEXANDER EYDELAND
ON BEHALF OF PJM INTERCONNECTION, L.L.C.

<u>1. PERSONAL AND PROFESSIONAL QUALIFICATIONS</u>

Q 1.1 PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A. My name is Dr. Alexander Eydeland. My address is 25 Central Park West, #5S, NY, NY 10023.

Q 1.2 BY WHOM AND IN WHAT CAPACITY ARE YOU EMPLOYED?

A. I am employed by PJM Interconnection, L.L.C. ("PJM") as a consultant.

Q 1.3 PLEASE DESCRIBE YOUR PROFESSIONAL EXPERIENCE.

A. I have more than twenty-five years of experience in energy markets including twelve years as a Managing Director at Morgan Stanley in charge of global commodities strategies and analytic modeling, and seven years as a Head of Research at Mirant Corp. I have also consulted for a number of energy companies, conducted quantitative research projects for various Wall Street firms, and worked as a mathematics professor at the University of Massachusetts at Amherst. I am a coauthor of the book "Energy and Power Risk Management." My papers on risk management have appeared in a number of major publications, and I have lectured extensively throughout the United States, Europe, and Japan. Since 2019, I have been actively involved with PJM's efforts to develop and design an initial margin requirement for participants in PJM's Financial Transmission Rights ("FTRs") auctions. In that capacity, working with PJM subject matter experts, I provided research and analytical support for the identification and consideration of alternative approaches, development and refinement of PJM's selected approach, and PJM stakeholder education, including review of the academic literature, on initial margin and various alternative approaches. I also authored and coded the prototype of the algorithm for the historical simulation ("HSIM") model that PJM plans to use for its proposed initial margin approach.

Q 1.4 PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND.

A. I hold a Ph.D. degree in Mathematics from Courant Institute of Mathematical Sciences.

2. PURPOSE AND SUMMARY OF AFFIDAVIT

Q 2.1 WHAT IS THE PURPOSE OF YOUR AFFIDAVIT?

A. My affidavit is offered to (1) discuss initial margin methodology and provide background on the use of models to calculate initial margin; (2) discuss PJM's adoption of an HSIM model; (3) discuss the concept of confidence interval; and (4) describe the back-testing of the PJM HSIM model.

3. BACKGROUND ON INITIAL MARGIN METHODOLOGY

Q 3.1 PLEASE DESCRIBE THE PURPOSE OF MARGIN.

A. In general, margin is the amount of financial collateral deposited by a market participant with a market operator or administrator to collateralize trade exposures introduced by the participant. Such margins are the first line of defense in the event of the market participant's default, to satisfy the financial obligations of that participant. The margins are designed to cover the market risk of a market participant's portfolio with a high level of confidence.

Q 3.2 PLEASE DESCRIBE INITIAL MARGIN.

A. Initial margin is the amount of collateral needed to cover the replacement cost of unwinding a market participant's portfolio in the case of default. Replacement cost is the cost incurred during the liquidation period. The liquidation period is the time period between the last variation margin posting and the complete portfolio closeout time. Initial margin is posted by a trading participant as collateral to protect against the financial consequences of default. It typically central counter-party, like PJMSettlement, Inc., should a participant default. It is calculated with a high degree of statistical likelihood across a participant's portfolio.

Q 3.3 PLEASE SUMMARIZE THE RESULTS OF YOUR ACADEMIC LITERATURE REVIEW ON THE USE OF MODELS TO CALCULATE INITIAL MARGIN EXPOSURE.

A. There have been many studies that have analyzed the potential exposure of central counter parties. Models that have been developed can be generally categorized into three (3) main categories: (1) statistical models, which assume simple underlying dynamics that derive the probability for the initial margin to be exceeded within a given time horizon; (2) optimization models, which calculate margin in a manner that balances the resilience of central clearing parties against costs to their members; and (3) options pricing based models, which explore the fact that the exposure profile of a central clearing party is approximately equivalent to a combination of "call and put" options because a central clearing party can strategically default if a contract loses more value than the posted initial margin.

Q 3.4 WHAT THEORIES HAVE BEEN CONSIDERED FOR CALCULATING INITIAL MARGIN?

A. Theories of calculating margin include the Extreme Value Theory (Longin 1999, Broussard 2001), the Standard Portfolio Analysis of Risk methodology (Kupiec 1994), the Value at Risk ("VaR") based IM system (Barone-Adesi et. al 2002) and the optimal liquidation strategy based on auctioning parts of a portfolio (Cont and Avellaneda 2013). As relevant here, the VaR approach has been found well-suited to assessing the risk that losses on complex portfolios will exceed the specified margin level.

Q 3.5 WHAT ARE THE APPROPRIATE METHODOLOGY GUIDELINES IN SELECTING A METHOD TO CALCULATE INITIAL MARGIN?

A. There are four (4) factors that are objectives of the method selected. These include: (1) margin levels should reflect the risk; (2) margin calculation methodologies should be transparent and relatively simple; (3) margin calculation methodologies should be replicable by counterparties to reduce dispute burdens; and (4) margin methodologies should take into consideration market liquidity. Methodologies that are designed to meet these objectives are generally referred to as VaR or risk-based methodologies. These methodologies are widely accepted in different markets for calculating initial margin and for other capital requirements.

Q 3.6 PLEASE DESCRIBE THE HSIM APPROACH TO INITIAL MARGIN CALCULATION.

A. The HSIM approach can be categorized as a VaR-based methodology that is widely accepted in different markets for calculating initial margin and other capital requirements. The HSIM model uses historical data to assess the impact of market moves on a given participant's portfolio. The portfolio is subjected to historically recorded price movements over a specified time period called the margin period of risk. The impact of these price movements is used to generate a distribution of the portfolio value changes. That distribution is then used to calculate the maximum loss corresponding to a fixed confidence level. The loss value determines the initial margin.

Q 3.7 WHAT ARE THE ADVANTAGES OF THE HSIM METHOD?

A. Advantages of the HSIM approach include that it is a standard risk-based approach used in a majority of markets, it is easy to implement, it is a transparent process with a low probability of dispute, and there is no need to determine correlations between paths as they are naturally included in the historical data. More specifically, the HSIM methodology produces a joint distribution of price movements without requiring such inputs as a correlation matrix or covariance matrix. Unlike alternative, theoretical-based, approaches to determining initial margin, that require calculation of correlation coefficients (which can be challenging) the HSIM approach is free from this intermediate step and uses historical data directly to determine the joint distribution of underlying risk factors (FTR prices in our case) without any assumptions or constraints on the choice of this distribution. The HSIM method does not require correlations because, by construction, price movements for each scenario are taken from the same period in the past ensuring correct joint behavior. Reflecting these advantages, HSIM has proved to be a reasonable methodology to be considered for computing initial margin.

4. PJM'S CHOICE OF AN HSIM MODEL FOR ITS MARGIN METHODOLOGY, AND THAT MODEL'S COMPONENTS

Q 4.1 WHY IS AN HSIM MODEL APPROPRIATE FOR PJM'S FTR MARKET?

A. Because an HSIM method uses real data it can capture unexpected events and correlations that would not necessarily be predicted by a theoretical model. The HSIM methodology allows one to model a complex joint behavior of various risk factors that impact portfolio values, making it a very effective tool in evaluating and managing risk. PJM's implementation of the HSIM model will help prevent under-collateralization in the PJM markets. Under-collateralization makes markets more vulnerable to defaults, for which PJM Members bear the burden.

PJM's HSIM model will use FTR auction data from 2008 to the most recent auction to determine the distribution of a participant's portfolio value over the margin period of risk. Margin period of risk, for purposes of the HSIM model, is the time period from the end of an FTR auction to the time PJM anticipates it would be able to liquidate a defaulted FTR transaction or position, by selling the FTRs back into the auction. Because PJM FTR auctions occur both monthly and annually, the margin period of risk is chosen to be two auction periods.

I should note an important clarification on terminology. Initial margin would traditionally refer to the margin required from a participant when it establishes a position. If that position does not change, no further “initial” margin would be required, but variation margin may be required to reflect subsequent value changes. The proposed HSIM, however, has an important difference from that traditional approach. Specifically, PJM will update the HSIM model with new pricing data after each FTR auction, and the model will then recalculate the margin needed for each participant's entire portfolio. Thus, the margin calculation will take into account not only the changes a participant made to its portfolio in the latest auction, but also new market data that materialized during that auction. Even if the participant was inactive in the latest auction, its required margin will still be updated based on the latest auction data, to reflect that the new data can and will affect the HSIM model’s assessment of the losses that portfolio can experience. To the extent I refer to the margin required by the HSIM model as “initial” margin, it should still be understood that this margin will be repriced after each auction, regardless of the participant’s changes (or not) during that auction.

Q 4.2 HOW WILL THE HSIM MODEL COMPONENT OF PJM’S MARGIN PROPOSAL USE THIS DATA?

A. The HSIM model will use this FTR auction historical price data to generate the distribution of possible changes in a participant’s portfolio value over the margin period of risk. That distribution is then used to determine the HSIM component of margin, defined as the maximum loss corresponding to a prescribed confidence level. In other words, the margin required by the HSIM model is set at a level that the simulated portfolio losses are not expected, with a given degree of confidence, to exceed.

Q 4.3 WHAT ROLE DOES THE CONFIDENCE INTERVAL PLAY IN THE MARGIN CALCULATION?

A. The confidence interval addresses the level of statistical certainty that the actual outcome will be within the range of possible outcomes produced by the HSIM model. More specifically, the confidence interval sets the level of assurance that the real-world outcome will not be *worse* than the modeled range of results. Absolute statistical uncertainty (i.e., 100% confidence) is impractical, since it would drive a predictive model to always land on the most extreme scenario conceivable from its data-set as the "not-to-exceed" result. As applied here, the confidence interval therefore expresses the desired degree of assurance that the dollar amount of the required margin will be sufficient to cover the highest portfolio loss due to default.

Q 4.4 HOW IS THE CONFIDENCE INTERVAL CHOSEN?

A. The confidence interval is best understood as a policy input to the calculation. It is not dictated by mathematics, nor is the confidence interval required to be set at one level for all cases. Selection of the confidence interval is instead a matter of judgement, balancing the objective to protect against the biggest set of adverse market scenarios, versus the costs resulting from decisions to achieve this objective.

Q 4.5 WHAT FACTORS DOES THE CHOICE OF CONFIDENCE INTERVAL BALANCE?

A. Here, a higher confidence interval means that it is more likely that the margin required from a participant by the HSIM model will not be exceeded by the losses that result from that participant's FTR portfolio during the margin period of risk, i.e., during the period of liquidating the participant's portfolio in case of default. A higher confidence interval imposes a cost, because achieving greater assurance that losses will not exceed the indicated margin requires the margin to be set at a higher level, and providing higher margin imposes financial costs on the parties that are subject to the margin requirement.

Q 4.6 IN YOUR VIEW, DOES THE SELECTED CONFIDENCE INTERVAL STRIKE A REASONABLE BALANCE HERE?

A. Yes. PJM's proposal uses a confidence interval of 97%, which is a high confidence interval and thus provides considerable protection against the possibility that portfolio losses may exceed the HSIM model's calculated margin. PJM also has conducted a cost/benefit analysis comparing exactly the costs and benefits I describe above as relevant to the choice of a confidence interval in this instance. As shown in the accompanying affidavit of Ms. Lisa Drauschak, PJM's Vice President, Chief Financial Officer and Treasurer, that analysis finds that the incremental costs of using a 99% confidence interval here, instead of a 97% confidence interval, appear to exceed the benefits. Last, given the extensive reliance of PJM Members on the FTR market in PJM's Locational Marginal Price based market, and the socialization of the costs of defaults among PJM Members, there is a substantial degree of overlap in this particular case between those who, collectively, bear the costs and those who, collectively, realize the benefits, which supports acknowledging the expressed preference of most PJM Members for using a 97% confidence interval.

Q 4.7 DOES THE PJM MODEL INCORPORATE A WEIGHTING COMPONENT?

A. Yes. When the HSIM model's margin is computed for the Balance of Planning Period ("BOPP"), those margins are first calculated independently for each month of the BOPP. Then, these monthly margins are aggregated into one BOPP margin. The aggregation can be done under two extreme assumptions. First extreme: the monthly losses are completely uncorrelated. In this case the aggregated BOPP margin is the square root of the sum of squares of the individual monthly margins ("square root of sum of squares"). Second extreme: the monthly losses are perfectly correlated. In that case, the aggregated BOPP margin is the sum of the monthly initial margins. The current methodology defines the BOPP margin as a point between these two extremes. The BOPP margin is a weighted sum of these two extreme values. The weights are determined to achieve an optimal balance between the collateral costs to the participants and the attainment of the risk management goals, such as, in particular, a successful passing of the back-test. Currently, the weights are fixed to be 80% for the square root of sum of squares and 20% for the sum of monthly initial margin. The choice of current weights is supported by the back-test results. Different weights were tested, and 80%/20% was the one that satisfied the target failure rate at the lowest collateral cost. In the future the weights may be changed as a result of the regular annual back-testing that incorporates new auction results, or as a result of increased market volatility.

Q 4.8 WHAT IS THE PURPOSE OF THE WEIGHTING COMPONENT OF THE MODEL?

A. As described above, PJM used two approaches to aggregate the monthly margin values discussed above into the balance of planning period, i.e., the summation approach and the square root sum approach. PJM used a blended approach to aggregate the monthly margin values into the single BOPP margin. This blending formula is designed to bring the back-testing results into the desired range. The choice of methods is driven by the goal to have as small a perturbation of the square sum of squares formula as possible.

5. BACK-TESTING OF THE PROPOSED HSIM MODEL

Q 5.1 WAS THE PROPOSED MODEL SUBJECTED TO BACK-TESTING?

A. Yes. The model was back-tested using available historical data.

Q 5.2 WHAT IS THE PURPOSE OF BACK-TESTING THE MODEL?

A. Back-testing a simulation model is a standard method for validating a particular trading or risk management methodology. The purpose of back-testing is to validate the model and to verify that in practice the model behaves as is expected in theory. Here, back-testing was used to determine whether the margin determined by the HSIM model was indeed sufficient, with 97% level of confidence, to cover the actual historical losses of a given portfolio.

Q 5.3 PLEASE DESCRIBE THE BACK-TESTING PROCEDURE

A. For a given auction in the past, and for a given participant's portfolio, the HSIM procedure is used to calculate the margin required from the participant at that auction. This margin is then compared with the *actual* losses of the portfolio during the margin period of risk, i.e., during the next two auction periods, in order to determine whether, if a default were to occur during that period and the portfolio had to be liquidated, the collected margin would be sufficient to cover the portfolio losses incurred during that period of portfolio liquidation.

Q 5.4 CAN YOU PROVIDE AN EXAMPLE OF THIS PROCESS?

A. Yes. I provide an example of the back-testing procedure in Table 1 below using historical data for two participants, Participant A and Participant B. During the July 2019 FTR monthly auction, Participant A acquired the contract ending in February 2020, and Participant B acquired the contract ending in March 2021. For both positions, PJM analyzed actual historical data for these positions utilizing a margin period of risk equal to two auction periods, and a confidence interval of 97%, to determine whether the HSIM model calculated an initial margin requirement sufficient to cover the losses PJM could experience (in case a participant defaulted and its portfolio should have been unwound) between July 31, 2019, and the future monthly FTR auction occurring in September 2022. As shown in Table 1, while both Participant A and Participant B experienced losses over two months after the July 2019 FTR auction, the initial margin the model required from Participant A was sufficient to cover A's losses, while the initial margin the model required from Participant B was not sufficient to cover B's losses. For Participant B, the "miss" of -193,829.51 (i.e., the difference between the actual portfolio loss and the required margin calculated by the HSIM model) is called a shortfall.

Table 1

Historical auction date	**Participant**	**FTR month end date**	**HSIM Value**	**Actual Loss**	**HSIM versus Actual Loss: Excess or Shortfall**
7/31/2019	Participant A	2/29/2020	664468.12	-240107.18	424360.94
7/31/2019	Participant B	3/31/2020	347787.16	-541616.67	-193829.51

The inability of the required initial margin to cover the actual loss is called a "failure." The objective of back-testing is to present the statistics of failures and to demonstrate that the failure rate is consistent with the choice of the confidence interval. For example, for a confidence interval of 97%, we expect the failure rate, i.e., the percentage of times initial margin was less than the actual loss, to be in the neighborhood of 3%. The back-testing results are considered to be satisfactory if the total failure rate is in agreement with the model confidence interval.

Q 5.5 WHAT WERE THE RESULTS OF THE BACK-TESTING?

A. In the performed back-testing, the failure rate did not exceed 3%, which is consistent with the HSIM model's confidence interval of 97%. These results allow us to conclude that back-testing supports the model methodology.

Q 5.6 DOES THIS COMPLETE YOUR AFFIDAVIT?

A. Yes, it does.

UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

	)	
PJM Interconnection, L.L.C.	)	**Docket No. ER22-____-000**
	)	

VERIFICATION

Dr. Alexander Eydeland, being first duly sworn, deposes and states that he is the Dr. Alexander Eydeland referred to in the foregoing document entitled "Affidavit of Dr. Alexander Eydeland on Behalf of PJM Interconnection, L.L.C." that he has read the same and is familiar with the contents thereof, and that the facts set forth therein are true and correct to the best of his knowledge, information, and belief.

/s/ _____________________
Dr. Alexander Eydeland