

The table below highlights the substantive changes to the Tariff (OATT) and Operating Agreement (OA) associated with the implementation of the proposed Performance-Based Regulation Compensation design. This proposal reflects the design discussions from the Regulation Performance Senior Task Force (RPSTF) and PJM believes this shows how the changes to the OATT and OA comply with Order 755.

Note that this table does not reflect the non-substantive changes that will also be part of this filing. For instance, changes of language from “the policies and procedures of the Office of the Interconnection” to “PJM Manuals” are not listed. Other non-substantive changes associated with the Quality Project are also not listed here but will be filed. Please refer to the red-line version of the Tariff and Operating Agreement to see all proposed changes on the RPSTF page. Additionally, this table does not reflect changes to Manual 11, 12 and 28 to support the RPSTF proposal, please refer to the red-line version of the Manual language on the RPSTF page to see all proposed changes.

Section	Original Language	Reason for Modification	New Language
Measurement and Verification OATT SCHEDULE 3, Regulation and Frequency Response Service	e. Qualified regulation must satisfy the verification tests described in the procedures of the Office of the Interconnection.	¶1200 Regarding accuracy, the Commission finds that it is appropriate to tie the measurement of a resource’s accuracy to the system operator’s AGC dispatch signal and not to ACE correction. Therefore, each RTO and ISO must propose a method for measuring a frequency regulation resource’s accuracy with respect to the dispatch signal it is sent and reflecting that accuracy in the resource’s payment. We do require that the same accuracy metric must be used for all resources providing frequency regulation service in an RTO or ISO P.107-108.	e. Qualified Regulation must satisfy the measurement and verification tests described in the PJM Manuals.
Measurement and Verification OA SCHEDULE 1, 1.7.18 and OATT ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 1.7.18 Regulation	Same as Schedule 3 above	Same as Schedule 3 above	Same as Schedule 3 above
Two Part Bidding/Measurement and	(e) A Market Seller that wishes to	¶130	(e) A Market Seller that wishes

<p>Verification</p> <p>ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 1.10.1 A Day ahead Energy Market Scheduling</p>	<p>make a resource available to sell Regulation service shall submit an offer for Regulation that shall specify the megawatt of Regulation being offered, which must equal or exceed 0.1 megawatts, the Regulation Zone for which such regulation is offered, the price of the offer in dollars per MWh, and such other information specified by the Office of the Interconnection as may be necessary to evaluate the offer and the resource's opportunity costs. The price of the offer shall not exceed \$100 per MWh in the case of Regulation offered for all Regulation Zones. In addition to any market-based offer for Regulation, the Market Seller also shall submit a cost-based offer. A cost-based offer must be in the form specified in the PJM Manuals and consist of the following components as well as any other components specified in the PJM Manuals:</p> <ul style="list-style-type: none"> i. The costs (in \$/MW) of the fuel cost increase due to the heat rate increase resulting from operating a unit at lower megawatt output incurred from the provision of Regulation; ii. The cost increase (in \$/MW) in variable operating and maintenance costs resulting from operating the unit at 	<p>We will require two-part bidding P.73.</p>	<p>to make a resource available to sell Regulation service shall submit an offer for Regulation that shall specify the megawatt of Regulation being offered, which must equal or exceed 0.1 megawatts, the Regulation Zone for which such regulation is offered, the price of the capability offer in dollars per MW, the price of the performance offer in Dollars per change in MW, and such other information specified by the Office of the Interconnection as may be necessary to evaluate the offer and the resource's opportunity costs. The total of the performance offer multiplied by the historical average mileage used in the market clearing plus the capability offer shall not exceed \$100 per MWh in the case of Regulation offered for all Regulation Zones. In addition to any market-based offer for Regulation, the Market Seller also shall submit a cost-based offer. A cost-based offer must be in the form specified in the PJM Manuals and consist of the following components as well as any other components specified in the PJM Manuals:</p> <ul style="list-style-type: none"> i. The costs (in \$/MW) of the fuel cost increase due to the heat rate increase resulting from operating the unit at lower megawatt output incurred from the provision of
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	<p>lower megawatt output incurred from the provision of Regulation; and</p> <p>iii. An adder of up to \$12.00 per megawatt of Regulation provided. Qualified Regulation capability must satisfy the verification tests specified in the PJM Manuals.</p>	<p>¶1200</p> <p>Regarding accuracy, the Commission finds that it is appropriate to tie the measurement of a resource's accuracy to the system operator's AGC dispatch signal and not to ACE correction. Therefore, each RTO and ISO must propose a method for measuring a frequency regulation resource's accuracy with respect to the dispatch signal it is sent and reflecting that accuracy in the resource's payment. We do require that the same accuracy metric must be used for all resources providing frequency regulation service in an RTO or ISO P.107-108.</p>	<p>Regulation;</p> <p>ii. The cost increase (in \$/MW) in variable operating and maintenance costs resulting from operating the unit at lower megawatt output incurred from the provision of Regulation; and</p> <p>iii. An adder of up to \$12.00 per megawatt of Regulation provided applied to the capability offer.</p> <p>Qualified Regulation capability must satisfy the measurement and verification tests specified in the procedures of the Office of the Interconnection.</p>
<p>Uniform Two-Part Payment ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 3.2.2 Regulation (a)</p>	<p>(a) Each Internal Market Buyer that is a Load Serving Entity in a Regulation Zone</p>	<p>¶197 In this Final Rule the Commission finds that current methods for compensating resources</p>	<p>a) Each Internal Market Buyer that is a Load Serving Entity in a Regulation Zone shall have an</p>

	<p>shall have an hourly Regulation objective equal to its pro rata share of the Regulation requirements of such Regulation Zone for the hour, based on the Market Buyer’s total load (net of operating Behind The Meter Generation, but not to be less than zero) in such Regulation Zone for the hour (—Regulation Obligation). An Internal Market Buyer that does not meet its hourly Regulation obligation shall be charged for Regulation dispatched by the Office of the Interconnection to meet such obligation at the Regulation market-clearing price determined in accordance with subsection (c) of this section, plus the amounts, if any, described in subsection (f) of this section.</p>	<p>for the provision of frequency regulation are unduly discriminatory. To remedy this undue discrimination, the Commission finds that it is just and reasonable to require all RTOs and ISOs to modify their tariffs to provide for a two-part payment to frequency regulation resources P.108.</p> <p>¶131 We will require, however, that the clearing performance price be paid uniformly to all resources cleared during the same settlement period, for the same reasons discussed above. P74.</p>	<p>hourly Regulation objective equal to its pro rata share of the Regulation requirements of such Regulation Zone for the hour, based on the Internal Market Buyer’s total load (net of operating Behind The Meter Generation, but not to be less than zero) in such Regulation Zone for the hour (“Regulation Obligation”). An Internal Market Buyer that does not meet its hourly Regulation obligation shall be charged the following for Regulation dispatched by the Office of the Interconnection to meet such obligation: (i) the Capability Regulation market-clearing price determined in accordance with subsection (h) of this section; (ii) the amounts, if any, described in subsection (f) of this section; and (iii) the Internal Market Buyer’s pro rata share of any performance credits paid to regulating resources calculated in accordance with subsection (g) of this section.</p>
<p>Market Clearing Price ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 3.2.2 Regulation (b)</p>	<p>(b) A Generating Market Buyer supplying Regulation in a Regulation Zone at the direction of the Office of the Interconnection in excess of its hourly Regulation obligation shall be credited for each increment of such</p>	<p>¶128 The Commission will require use of a market-based price, rather than an administratively-determined price, on which to base the frequency regulation performance payment. This price must reflect the market participant bids submitted by</p>	<p>(b) Each Market Seller and Generating Market Buyer shall be credited for each of its resources supplying Regulation in a Regulation Zone at the direction of the Office of the Interconnection such that the calculated credit for each increment</p>

	<p>Regulation at the higher of (i) the Regulation marketclearing price in such Regulation Zone or (ii) the sum of the regulation offer and the unit-specific opportunity cost of the generation resource supplying the increment of Regulation, as determined by the Office of the Interconnection in accordance with procedures specified in the PJM Manuals.</p>	<p>resources for the provision of frequency regulation service P.72.</p>	<p>of Regulation provided by each resource shall be the Regulation market clearing price.</p>
<p>Market Clearing ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 3.2.2 Regulation (c)</p>	<p>(c) The Regulation market-clearing price in each Regulation Zone shall be determined at a time to be determined by the Office of the Interconnection which shall be no earlier than the day before the Operating Day. The market-clearing price for each regulating hour shall be equal to the highest sum of a resource’s Regulation offer plus its estimated unit specific opportunity costs, determined as described in subsection (d) below from among the resources selected to provide Regulation. A resource’s Regulation offer by any Market Seller that fails the three-pivotal supplier test set forth in section 3.3.2A.1 of this Schedule shall not exceed the cost of providing Regulation from such resource, plus twelve dollars, as determined pursuant to the formula in section 1.10.1A(e) of this Schedule.</p>	<p>¶ 130 FERC will not mandate specific bidding parameters or other technical details that will determine the pricing methodology. ... We will allow the RTOs and ISOs to determine how to implement the market-based pricing we are mandating, as discussed in the compliance section below P. 74-75.</p> <p>¶199 The Commission finds that paying to all cleared frequency regulation resources a uniform clearing price that includes the marginal resource’s opportunity costs is just and reasonable. Accordingly, this Final Rule requires that all RTOs and ISOs with centrally-procured frequency regulation resources must provide for such opportunity costs in their tariffs. Further, this uniform clearing price must be market-based, derived from market-participant bids for the provision of frequency</p>	<p>(c) The total Regulation market-clearing prices in each Regulation Zone shall be determined at a time to be determined by the Office of the Interconnection which shall be no earlier than the day before the Operating Day. In accordance with the PJM Manuals, the total Regulation market clearing price shall be calculated by optimizing the dispatch profile to obtain the lowest cost combination set of resources that satisfies the Regulation requirement. The total Regulation market clearing price shall include: (i) the performance Regulation market-clearing price in a Regulation Zone that shall be calculated in accordance with subsection (g) of this section; (ii) the capability Regulation market clearing price that shall be calculated in accordance with subsection (h) of this section; and (iii) a Regulation resource’s estimated unit-specific opportunity costs, determined as</p>

		regulation capacity.	described in subsection (d) below from among the resources selected to provide Regulation. A resource's Regulation offer by any Market Seller that fails the three-pivotal supplier test set forth in section 3.3.2A.1 of this Schedule shall not exceed the cost of providing Regulation from such resource, plus the twelve dollars, as determined pursuant to the formula in section 1.10.1A(e) of this Schedule.
<p>Performance Payment ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 3.2.2 Regulation (g)</p>	<p>No existing rule This subsection was added to specifically note how the performance regulation market clearing price would be set.</p>	<p>¶199. The second part of the payment shall be a performance payment that reflects the amount of work each resource performs in real-time. This payment must reflect the accuracy with which each resource responds to the system operator's dispatch signal. The performance payment must be market-based (i.e., based on resource bids that reflect the cost of providing the service). We leave to the RTOs and ISOs to propose such details as bidding parameters and other details that may need to vary by market and region P.107.</p>	<p>(g) To determine the performance Regulation market-clearing price for each Regulation Zone, the Office of the Interconnection shall adjust the submitted performance offer for each resource in accordance with the historical performance of that resource, the expected amount of Regulation that resource will be dispatched based on the historical ratio of control signals calculated by the Office of the Interconnection, and the ratio of benefits to system control for following the Regulation control signal for which that resource is qualified. The maximum adjusted performance offer of all cleared resources will set the performance Regulation market-clearing price. The owner of each Regulation resource that actively follows the Office of the Interconnection's Regulation signals and instructions,</p>

			will be credited for Regulation performance based on the assigned MW(s), the performance Regulation market-clearing price, the amount of Regulation performance of the resource provides during the market hour, and the accuracy with which each resource responds to the Office of the Interconnection's Regulation signals during the market hour.
Capability Payment ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 3.2.2 Regulation (h)	No existing rule This subsection was added to specifically note how the capability regulation market clearing price would be set.	¶198. The first part of this payment will be a capacity, or option, payment for keeping a resource's capacity in reserve in the event that it is needed to provide real-time frequency regulation service. This payment must be a uniform payment to all cleared resources, and must be a payment that includes the marginal unit's opportunity costs. The RTO or ISO must calculate and include in its market-clearing process the cross-product opportunity costs of each resource offering its capacity. We will leave to the RTOs and ISOs the discretion of proposing to whom the responsibility falls of calculating any applicable inter-temporal opportunity costs. This capacity payment also must be based on competitive market-based bids for the provision of frequency regulation capacity submitted by resources. P.107	(h) The Office of the Interconnection shall calculate the capability Regulation market-clearing price for each Regulation Zone by subtracting the performance Regulation market-clearing price described in subsection (g) from the total Regulation market clearing price described in subsection (c). This residual sets the capability Regulation market clearing price for that market hour. The owner of each Regulation resource that actively follows the Office of the Interconnection's Regulation signals and instructions will be credited for Regulation capability based on the assigned MW and the capacity Regulation market-clearing price.
Inter-temporal Opportunity Costs ATTACHMENT K-APPENDIX PJM OA,	No existing rule This subsection was added to	¶103 Regarding inter-temporal opportunity costs, there is little	(i) In accordance with the processes described in the PJM Manuals, the

<p>SCHEDULE 1, 3.2.2 Regulation (i)</p>	<p>specifically note the inclusion of inter-temporal opportunity costs and the responsibility for calculating them.</p>	<p>agreement on how these costs should be calculated, and to whom that responsibility should fall. The Commission will require the RTOs and ISOs to allow for inter-temporal opportunity costs to be included in a resource's offer to sell frequency regulation service, with the requirement that the costs be verifiable. We find that inter-temporal opportunity costs are a legitimate cost for a market participant to include in its offer to sell frequency regulation and thus must be allowed. However, we will allow the RTOs and ISOs to propose who is responsible for calculating such costs, whether the RTO or ISO itself or market participants. P61.</p>	<p>Office of the Interconnection shall: <i>(i) calculate inter-temporal opportunity costs for each applicable resource; (ii) include such inter-temporal opportunity costs in each applicable resource's offer to sell frequency Regulation service; and (iii) account for such inter-temporal opportunity costs in the Regulation market-clearing price.</i></p>
<p>Three Pivotal Supplier ATTACHMENT K-APPENDIX PJM OA, SCHEDULE 1, 3.2.2 1A Three Pivotal Supplier</p>	<p>(i) The three-pivotal supplier test will include in the definition of available supply all offers from resources capable of satisfying the Regulation requirement of the PJM Region for which the cost-based offer plus any eligible opportunity costs is no greater than 150 percent of the clearing price that would be calculated if all offers were limited to cost (plus eligible opportunity costs).</p>	<p>¶128The Commission will require use of a market-based price, rather than an administratively-determined price, on which to base the frequency regulation performance payment. This price must reflect the market participant bids submitted by resources for the provision of frequency regulation service P.72.</p>	<p>(i) The three-pivotal supplier test will include in the definition of available supply all offers from resources capable of satisfying the Regulation requirement of the PJM Region for which the capability cost-based offer plus the performance cost-based offer plus any eligible opportunity costs is no greater than 150 percent of the clearing price that would be calculated if all offers were limited to cost (plus eligible opportunity costs).</p>