



Executive Summary of Beacon Power's Proposal to the RMISTF

Beacon Power (Beacon) appreciates the opportunity to provide comments to PJM Staff and stakeholders in the Regulation Market Issues Senior Task Force (RMISTF) and to fully expand on the proposed market solutions set forth in its package proposal before the RMISTF. By way of background, Beacon operates a 20 MW flywheel-based energy storage facility in the PJM footprint. In response to PJM's development of a regulation market specifically designed to incent entry of dynamic, fast-responding resources, the Beacon facility entered the PJM space. Since the time of market entry, Beacon has consistently provided the desired quality of frequency regulation service. While Beacon commends the staff of PJM and the Independent Market Monitor for their level of engagement, their willingness to respond to stakeholder concerns, and their efforts to develop solutions to address the existing operational concerns within the PJM regulation market, some elements of PJM's solution package provide Beacon with significant concern.

PJM has engaged stakeholders over the last eighteen months and through two committees to help identify the operational and market-based issues negatively impacting the effectiveness of its regulation market. Through these processes, PJM has identified a number of factors that contribute to the diminution in regulation market performance. Significantly, PJM and the IMM have stated the shape of the existing Benefits Factor (BF) Curve is likely incorrect and does not appropriately represent the trade-off value between the RegA and the RegD MWs. At times, this has led PJM to procure too much RegD and an insufficient amount of RegA and has caused and continues to cause operational issues when ACE persists in one direction for an extended period of time. Further, PJM has found the current RegA and RegD signals fail to optimize the potential benefits offered to the system by those respective resource types. Taken together, these factors occasionally leave PJM in a situation where there is an insufficient volume of regulation MWs to appropriately balance ACE.

Any potential solution to address the operational and market-based issues recently seen in PJM's regulation market should align with the existing market structure to avoid undue and significant market disturbance and comply with the rulings central to Federal Energy Regulatory Commission (FERC) Order 755.¹ Order 755 requires that all resources providing regulation service be fairly compensated for the service provided based on the amount of work performed. Accordingly, Order 755 directs that all resources be compensated for the work performed through an evaluation of movement or mileage. ("A mileage-based performance payment component ... will provide compensation that appropriately recognizes a resource's actual ramp rate capability." Order 755 at P 177). This requirement recognizes the benefits offered to the system by dynamic resources that can respond to PJM's regulation signal more quickly and accurately than their more traditional counterparts, and the need for those resources to be compensated fairly. Any proposed solution that seeks to require existing PJM-committed dynamic resources to ramp faster and more frequently than

¹ *Frequency Regulation Compensation in the Organized Wholesale Power Markets*, 137 FERC ¶ 61,064 (2011) (Order 755).



their more traditional counterparts, while ensuring that dynamic resources are compensated less is plainly unfair, unreasonable, and counter to the explicit directives contained in Order 755.

Beacon recognizes that PJM has the authority, through its reliability directives, to modify the regulation signals and the shape of the BF Curve, and has a timeline in place to implement various changes to those items². PJM's optimization of the regulation signals through the implementation of its proposed 30-minute conditionally neutral signal and PJM's modification of the BF curve to address resource procurement issues could very likely improve the operation and effectiveness of its regulation market. While Beacon will address additional items below, it is significant to flag PJM's proposed modification to settlements that would eliminate the inclusion of the mileage ratio in favor of the Marginal Rate of Technical Substitution (MRTS)³ value but will have no positive impact on market operations or resource performance.

With regards to the regulation signal itself, Beacon highlights the importance of state of charge management. It is essential to the energy-limited resources that PJM attracted to the market through this neutrality function that neutrality is maintained. Any proposal to eliminate neutrality would be uniquely targeted at energy-limited resources participating in the regulation market and would punish such resources for having operational limits. To address any operational issues PJM has attributed to neutrality, such as signal pegging and the need for manual operator intervention, PJM should focus on procuring the appropriate balance of energy-limited resources and ramp-limited resources. PJM designed a regulation market around the operational limits of its resources such that RegD resources respond to ACE quickly, while RegA resources respond more slowly to carry the signal for a prolonged period of time and to support the regulation signal's neutrality function. By securing the proper mix of RegA and RegD resources, PJM will be able to avoid the operational issues associated with procuring too many RegD MWs and too few RegA MWs.

Related to securing a proper mix of RegA and RegD resources, PJM has indicated that they occasionally experience times where too few RegA MWs are secured. PJM's proposal to modify the way in which the BF curve is used in market clearing exacerbates this issue. At present, PJM clears "blocks" of RegD MWs under the BF curve that are in the shape of a rectangle. PJM is proposing to now clear the entire area under the BF curve, rather than relying on the unit-specific block shape. The effect of this administrative change is that the RegD MWs that clear the market will count as a greater quantity of effective MWs, thus reducing the quantity of RegA resources that clear the market. As a result, PJM's proposed solution to market clearing could worsen the existing issues in procuring the proper mix of resources by limiting market space for RegA MWs, and negating any potential benefits associated with adjusting the BF curve. Also, in order to limit the potential impact of additional RegD resources, PJM should cap the amount of performance adjusted RegD capacity procured. Otherwise, the newly proposed MRTS curves could significantly expand the allowable RegD capacity procurement, further reducing the quantity of RegA capacity procured.

² In this summary, Beacon does not address items 1 through 9 as set forth in the RMISTF package solution matrix as those items deal the MRTS/BF curve and the regulation signal itself.

³ In describing the slope of the Benefits Factor Curve that is currently used in the PJM Regulation Market, the Independent Market Monitor equated it to the Marginal Rate of Technical Substitution or MRTS. Regulation Market Review: Presentation to the Regulation Performance Impacts Group at 10. Available at: <http://www.pjm.com/~media/committees-groups/committees/oc/20150701-rpi/20150701-regulation%20market-overview.ashx>.



Shifting gears to resource performance and performance scoring, Beacon agrees with PJM that the areas of performance scoring, qualification, and the minimum allowable participation threshold need some modification. Beacon agrees with PJM's recommendation to permit uprate testing on a monthly basis. In using PJM's proposed changes to performance scoring as a basis, Beacon also recommends using only the precision score if precision is less than 75% during a scoring interval. However, Beacon recommends calculating such a score as $(0 \times \text{Accuracy} + 0 \times \text{Delay} + 1 \times \text{Precision})$, rather than PJM's $(0 \times \text{Accuracy} + 0 \times \text{Delay} + \frac{1}{3} \times \text{Precision})$. This adjustment prevents having arbitrary cliffs in performance scoring. Moreover, Beacon recommends a minimum allowable participation threshold of 60% after a 6-month transition period, rather than the PJM-proposed 75%. In light of the sweeping market reforms and changes to the regulation signal, Beacon feels an increase in the threshold from 40% to 60% will incent resources to perform better. But that jumping from 40% to 75% may place well-performing resources at risk of falling out of the market as PJM and market participants gain experience in managing operations under the new signal.

The most significant item on the RMISTF's package matrix to Beacon is PJM's proposal to change the way in which the market is settled. At present, PJM compensates resources based on the sum of Performance Credits and Capability Credits. The Performance component is multiplied by a mileage ratio. The mileage ratio is representative of the amount of movement and work a RegD resource performs against that of a traditional RegA resource. Thus, RegA resources are compensated at a mileage ratio of 1. RegD resources are compared to RegA resources and compensated for the additional movement and ramping PJM is requiring from those resources. PJM has proposed to remove the mileage ratio from settlements and to apply the MRTS/BF to both the Performance and Capability portions of settlements. Due to the current level of RegD market participation, which is the result of PJM's current market design, the MRTS/BF will always be less than one under these conditions. In looking at this change in conjunction with PJM's proposed signal modifications, RegD resources would be required to ramp more, provide more movement, and perform more work, but would be compensated at a rate less than RegA resources. This proposed disparate treatment of dynamic resources would make PJM the only RTO/ISO under FERC jurisdiction that fails to compensate for mileage. It should be noted that PJM's previous attempt to exclude mileage from settlements was flatly rejected by the Commission. ("By failing to include actual mileage in the settlement equation, PJM appears to be inconsistent with Order 755." *PJM Interconnection, L.L.C.*, 141 FERC ¶ 61,134 at P 46 (2012)). PJM's proposal to remove mileage from settlements is not only inconsistent with Order 755, but also unrelated to the resolution of PJM's operational issues, and unduly discriminatory against dynamic resources providing regulation service in the PJM region.