I. Introduction

The Hydro Coalition ("the Coalition") submits the following comments with respect to PJM’s latest iteration of its Capacity Performance Proposal. The Coalition represents a valuable portfolio of both run-of-river and pumped storage assets in PJM that have proven to be reliable, low-cost resources for the PJM system over the years. However, the Coalition is very concerned that the Capacity Performance Proposal will threaten the viability of these resources in the future. Loss of hydro resources will further dilute fuel and capacity resource diversity on PJM’s system, as it grows more and more reliant on a single fuel source, natural gas, resulting in decreased reliability. While PJM claims to be promoting reliability and operational diversity with the Capacity Performance Proposal, the current design does not support operational diversity, which will reduce reliability.

During the recent PJM stakeholder discussion driven by last year’s polar vortex, there has been a significant focus on dual-fueled resources, or resources with fuel on site, while the significant reliability benefits from hydro resources have been overlooked and taken for granted. Historically, hydro resources have been a relatively reliable resource for PJM and its members. Many hydro resources can be considered mid-merit with a relatively high capacity much closer to that of a base load generation resource than that of solar or wind resources. PJM can depend on solid performance from hydro going forward, but only as long as it remains economical for hydro generators to participate as a capacity resource.

Furthermore, hydro assets were not a significant contributor to the capacity shortage experienced during the polar vortex. Unlike gas generators that were not able to generate any energy, hydro generators did generate as expected. In some cases hydro generators exceeded expectations.

In particular, the Coalition believes that PJM’s hyper-focus on addressing performance issues with other resource types will in fact over-penalize hydro resources in comparison to other capacity resources. In theory, the performance penalties should be used to incent capacity resources to become more reliable during emergency peak conditions. However, the proposed penalty does nothing but harm when the cause of limited performance is outside of the control of the resource and no amount of investment can improve performance. Such is the case with adverse water conditions for run-of-river hydro, or for pumped storage when it must pump water to its reservoir to
make it available for the next peak period. The coalition provides a number of suggested changes in order to correct some of the unintended consequences of the current proposal and to preserve the availability of hydro assets as capacity resources going forward.

Ultimately, hydro and pumped storage resources contribute to supply diversity and the competitiveness of the PJM capacity market. This is particularly important as the EPA moves forward on regulations to limit greenhouse gas emissions which will affect the availability of most other capacity resources except hydro resources. Implementation of these regulations will significantly increase the need for hydro resources to be part of a balanced and reliable generation portfolio. PJM should avoid any changes to market design that results in these valuable resources making the business decision to exit the capacity market because the risks drastically outweigh any benefits.

II. Hydroelectric Generating Assets

In spite of all of the benefits of hydro, hydro assets are extremely capital-intensive. Maintenance expenses can also be high for hydro resources. Additionally, revenues from the sale of RECs from hydro facilities are generally lower than from other renewable resources, such as wind and solar, as hydro RECs are relatively low in price and very illiquid. Finally, unlike other renewable resources, hydro is not eligible for federal investment tax credit subsidies.

As a result, capacity revenues are critical to the financial viability of hydro resources and they must be able to rely on stable and sufficient capacity revenues. In order for this to continue under PJM’s Capacity Performance Proposal, the Coalition strongly believes that hydro resources must be given a reasonable opportunity to participate as Capacity Performance resources and not face unmanageable penalty risks that are overly punitive and threaten financial viability of the resource for reasons outside of their control.

III. Run-of-River Hydro Comments

With its current Capacity Performance Proposal, PJM has unfairly targeted hydro when hydro has been a relatively reliable resource over the long-term. The PJM Proposal does not impact any other capacity resource more significantly than hydro. The changes that PJM is proposing are extremely harmful to hydro and unfairly penalize hydro relative to other capacity resources. These changes will result in capacity volumes and capacity revenues for hydro dropping drastically. For example, a run-of-river resource that chooses to have its UCAP calculated like an intermittent resource could have its UCAP value decreased by more than 65%. Furthermore, hydro as a Base Capacity product will realize substantially lower pricing that will further reduce revenues. PJM’s proposed changes will negatively impact mainly hydro assets, will threaten the financial viability of hydro, and will deter the future development of new hydro generation. As a result, we believe that the Proposal is unfairly discriminatory to hydro.
The Coalition supports PJM’s proposal to allow run-of-river hydro resources to have the option to offer with UCAP values determined consistent with traditional generation resources or with UCAP values determined consistent with that of an intermittent resource. However, the Coalition proposes some changes within each option to ensure that the full reliability value of the resource can reasonably participate as a Capacity Performance resource. Failure to do so will adversely affect the amount of capacity that can be offered from hydro resources and thereby significantly reduce the amount of capacity revenue received, despite their history as reliable capacity resources.

A. Proposed Changes to UCAP Calculation for Run-of-River Hydro

1. Traditional Calculation of UCAP

As the PJM Independent Market Monitor (“IMM”) has explained in his State of the Market Reports, in 2006, the North American Electric Reliability Corporation (“NERC”) created specifications for certain types of outages to be deemed Outside Management Control (“OMC”). An outage can be classified as an OMC outage only if the outage meets the requirements outlined in Appendix K of the “Generator Availability Data System Data Reporting Instructions.” Appendix K of the “Generator Availability Data Systems Data Reporting Instructions” also lists specific cause codes that are standardized for specific outage causes. The IMM explained, “Not all outages caused by the factors in these specific OMC cause codes are OMC outages. For example, according to the NERC specifications, fuel quality issues (codes 9200 to 9299) may be within the control of the owner or outside management control. Each outage must be considered separately per the NERC directive.” 2012 State of the Market Report for PJM at 163-164. PJM excludes OMC outages from the calculations used to determine the level of unforced capacity (or “EFORd”) for specific units that must be offered in PJM’s Capacity Market.

PJM, in its most recent proposal, has accepted the recommendation of the IMM to immediately do away with the use of OMC codes other than those associated with transmission/distribution outages. For the reasons below, the Coalition requests that PJM modify and retain certain OMC codes for hydro resources in order for the traditional calculation of UCAP to accurately reflect the reliability value of run-of-river hydro assets.

While the Coalition understands the rationale for removing OMC codes when there are alternate means available to substantially mitigate or eliminate the events for which the OMC codes have been used in the past, certain events are not within the control of the operator. This is most notable in the case of run-of-river resources. Run-of-river resources by their very nature are subject to variability of performance caused by weather more so than any other type of electric generation resource. It is certainly appropriate to employ OMC codes in the context of events which have no remedy or are entirely outside of the control of the operator; particularly those which can be attributed
to an act of nature over which operators have no control and no amount of investment can remedy. These OMC codes have the same rationale as the transmission/distribution OMC codes which PJM proposes to retain.

It is also appropriate to limit the use of such codes to hydro resources and not allow broad, general application to other generators. The limitation will preserve the purpose of removing the OMC codes – to force generators to be more reliable where it is within their ability to do so. The NERC GADS guidelines in Appendix K describe OMC lack of fuel as “lack of fuel where the operator is not in control of contracts, supply lines, or delivery of fuels.” As the fuel source for hydros is the river, lack of fuel is not within their control and there are no contracts, supply lines or deliveries and no amount of investment can change that.

The PJM IMM has also argued that PJM does not have a clear, documented, public set of criteria for designating outages as OMC. The Coalition appreciates the need to not only limit the OMC codes, but also to clarify them. Therefore, the Coalition requests that the following three OMC codes be revised as set forth below and retained for run-of-river resources.

<table>
<thead>
<tr>
<th>Code</th>
<th>Current Description</th>
<th>Proposed Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9000</td>
<td>Flood</td>
<td>High Water Conditions (hydro)</td>
</tr>
<tr>
<td>9135</td>
<td>Lack of water (hydro)</td>
<td>No change</td>
</tr>
<tr>
<td>9320</td>
<td>Other miscellaneous external problems</td>
<td>Debris (hydro)</td>
</tr>
</tbody>
</table>

The retention of these codes will provide a tool for the run-of-river resource to more accurately reflect its high reliability factor based on actions within its control. This resource capability will be available to the system when PJM needs all the generation it can muster in times of alerts or shortages and should be offered into the capacity market. Presently, the above codes when used are reviewed by PJM on a case-by-case basis before they are officially allowed. The Coalition has found this to be a fair means of preventing code abuse. The types of events which the codes depict are truly ones which are out of the control of the plant management and which cannot be foreseen long in advance nor avoided. For example, in the aftermath of Hurricane Sandy and Tropical Storm Lee many run-of-river hydro plants were able to use these codes in order to perform their post-storm clean-up and restoration efforts. It is unreasonable to penalize the UCAP of such resources in these situations, but that will be the consequence if PJM makes these OMC codes unavailable.

2. Intermittent Resource Calculation of UCAP

In the alternative to being treated as a traditional generation unit without the availability of OMC codes, PJM proposes to allow run-of-river resources to elect to become an Intermittent Resource whereby EFORD is not applicable. UCAP value is based on the average of June through August peak-hour output over three calendar years. This may be a fair alternative if there were some accommodation to allow the
same OMC codes mentioned above to be requested by the run-of-river resource in calculating UCAP. This will then allow for preserving a higher, more accurate value for UCAP. Having no OMC codes available will unduly suppress the UCAP value and misrepresent the resources reliability contribution.

Additionally, the Coalition believes that if a run-of-river resource chooses to utilize the Intermittent resource UCAP methodology and also chooses to bid into the Capacity Performance market, that asset should be exempt from penalties since their UCAP volumes are already heavily derated.

IV. Pumped Storage Resource Comments

PJM’s October 7th proposal provides objectives for the Capacity Performance product. Pumped storage meets each of these objectives, including: 1) fuel security through a dependable fuel source met with on-site water storage; 2) higher overall availability and enhanced operational performance during peak periods, as illustrated by PJM’s EFORd data presented at the August 18, 2014 Operating Committee meeting; 3) flexible resource operational parameters, including very short notice and start-up times, wide operating bands, and very fast ramping times; and, 4) operational diversity provided by on-site storage of a fairly unique fuel (water) supplied by generation across PJM over a highly reliable transmission delivery system to a fairly simple and unique type of generator.

For example, Bath County has six 505 MW units, each with a wide operating band and rapid response capability. They have cycling capability to quickly turn units on and off within a 10-minute commitment period. They can quickly respond to load following, interchange ramps and ACE requirements. Their on-site storage is highly reliable in summer and winter, and for which PJM has control over deliverability of pumping energy over a reliable electric transmission system. Finally, these resources operate with no environmental limits. And yet, PJM’s current proposal would significantly limit the ability of pumped storage to participate as a Capacity Performance product.

A. The Current Capacity Performance Proposal does not Fully Value Pumped Storage Resources

While benefits of pumped storage clearly place it at the level of a Capacity Performance Resource, the Coalition believes that PJM’s current proposal unreasonably limits their value as capacity while still retaining their reliability value to operations. In the case of Coalition member Dominion Virginia Power, pumped storage facilities have been planned and utilized as an integral part of the system, both before PJM and thus far in PJM. This planning included deliverability studies and transmission system upgrades to ensure capacity deliverability for maximum facility output. Operation of these facilities optimizes use of storage capability and maximum facility output by both Dominion Virginia Power and PJM across daily load and LMP profiles, which, in PJM’s case, includes utilizing pumped storage to optimize use of the generation portfolio across PJM.
Pumped storage resources have historically been treated as a capacity resource at their rated full output. Storage limitations are recognized and planned for in order to ensure that daily peak load and reserve requirements are met. In the case of Bath County, Dominion Virginia Power historically utilized multi-day ahead, day ahead and intra-day operational planning to optimize use of the facility from both reliability and economic standpoints. The generation was typically load following, coordinating with other resources that tended to be loaded in blocks. Operating in this manner effectively utilized and optimized pumped storage capacity.

PJM likewise has the ability to optimize pumped storage use to provide the best reliability and economic application for the time period being considered, including emergency peak conditions. PJM should both use this capability and recognize its resulting capacity value. Operating to that end would include:

- Continuing to provide the capability for pumped storage to be optimized as part of the day ahead market solution by providing energy and/or reserves;
- Optimizing in real-time for utilization of pumped storage based on changing load conditions and operational uncertainty; and
- Utilizing pumped storage as the flexible and complementary resource that it is in order to coordinate with operation of less flexible resources and ensure maximum capacity availability at peak load conditions.

PJM can improve the efficiency of the overall market by optimizing its use of the maximum capacity value of pumped storage, rather than blindly treating it as another type of resource. As a result, fewer resources will need to be built.

**B. Requested Modifications to the Capacity Performance Proposal**

PJM’s optimization of pumped storage flexibility and recognition of its full reliability value in the capacity market provides optimum benefits to all stakeholders. The Coalition believes it is PJM’s responsibility to recognize and utilize pumped storage as it is designed and to provide the ability for pumped storage owners and LSEs to gain full value for these assets. Consequently, the Coalition requests the following enhancements to PJM’s Capacity Performance proposal.

1. **Penalty Exposure for Pumped Storage Should be Capped at 10 hours**

PJM’s October 7th proposal states that pumped storage resources may be offered as Capacity Performance resources with the expectation to be available for sustained operation for more than 10 hours during peak load conditions for multiple consecutive days. In other forums, PJM has presented the 10-hour operational requirement as either a single block for summer or a split block for winter peaks.

The Coalition believes that this 10-hour operating requirement should be the basis for evaluating the performance of a pumped storage resource and the assessment of any daily performance penalties. Within this 10-hour period, a pumped storage resource could be operated:

- At a fixed MW level for the entire 10 hour period.
• To load follow, with generation at low levels during the beginning and end of the 10-hour period and generation at maximum facility rating during the peak load hours of the period. The maximum facility rating could exceed that provided by operating at a fixed MW level for 10 hours. The load-following capability allows PJM to maintain a constant reserve margin as load increases to its peak and provides PJM with greater operational flexibility while retaining use of the facility at maximum output.

• The facility could be operated at a lower fixed MW level over a period longer than 10 hours.

Simply basing a capacity resource’s reliability value on the maximum amount of capacity it can provide over an extended period of time is short-sighted. Given PJM’s load profile, the value of flexibility over 10 hours greatly exceeds the value provided by extending operation past 10 hours at a lower, fixed capacity level (i.e., running in a manner similar to less flexible resources). Therefore, 10 hours is a suitable basis on which to rate pumped storage as a unique resource and to use as the basis for a daily penalty exposure cap.

In addition to being rational from an operating viewpoint, clearly establishing the 10-hour operating window as the limit on daily penalty exposure removes a tremendous amount of uncertainty around penalty risk. While PJM has stated that they would try to limit pumped storage runs to 10 hours, they make no promises and have stated that if PJM wants pumped storage longer than 10 hours, the penalty exposure extends to whatever that duration happens to be. This uncertainty is both inconsistent with optimal use of pumped storage and creates a lack of clarity that will cause unnecessary de-rating of pumped storage facilities due to penalty risk. In either case, excessive penalties or unnecessary de-rating will unreasonably devalue pumped storage’s reliability contribution to system operations and the market.

2. Use of Pumped Storage for Peak Shaving should be Facilitated

There is an additional equity issue with regard to pumped storage capacity credit that becomes increasingly important as pumped storage is devalued in the capacity market. When an LSE with pumped storage receives lower capacity payments, the gap widens between capacity payments and the savings the LSE could achieve by using pumped storage to shave its peak load value and reduce its capacity obligation.

If used as a peak-shaving resource and operated across daily peak load hours, an LSE can systematically reduce its load and related load forecast thereby ultimately reducing the LSE’s capacity obligation. Effectively, this would allow the LSE to receive credit for full output of the plant, if run across peak hours, rather than at a rating based on extended operation at a reduced output. Additionally, the LSE would bear the peak shaving performance risk of the pumped storage resource in the cost of future capacity obligations.

An LSE willing to take peak shaving performance risk with its pumped storage resource should not be constrained to just the capacity market as the vehicle to derive value from the pumped storage resource. PJM should review its tariff provisions and
include with its Capacity Performance Proposal filing any changes necessary to facilitate realistic use of and receiving full credit for pumped storage as a peak shaving option for LSEs in both any transition period during which pumped storage is converted to peak shaving and over subsequent periods.

V. Non-Performance Penalties and Stop-Loss Provision

Simply addressing the UCAP valuations and Capacity Performance product eligibility issues above is not enough. PJM is proposing very onerous hourly non-performance penalties. These penalties are overly punitive to hydro resources and as a result could prohibit a hydro resource from becoming a capacity resource or potentially cause significant financial distress on a hydro asset because of an abnormal hydrology year. Performance penalties must be balanced with symmetrical risk and reward scenarios so that an asset can access the financial markets in an efficient manner.

The proposed hourly penalty for “Shortage” hours of $2,700 per MWh would be extremely harmful to hydro resources. The Coalition proposes that the penalty for “Non-Shortage” hours be applied to hydro during all hours of non-performance, including during Shortage hours. This penalty would be sufficient to incentivize strong performance.

Furthermore, capacity resources must not be penalized because of issues occurring completely outside their control. If a capacity resource is unable to perform for reasons beyond its control, no performance incentive regime can incent the resource behavior PJM desires. For example, a hydro resource cannot make an investment to improve the availability of water during low water conditions. It should not be penalized in this type of situation.

The annual stop-loss provision that PJM proposes (1.5 x annual capacity revenue) is too punitive and should be reduced for hydro resources to a maximum of 1.0 x annual capacity revenue. The single outage event stop-loss provision (0.25-1.0 x annual capacity revenue) is also too punitive and should be reduced for hydro to a maximum of 0.25 x annual capacity revenue.

Additionally, the Coalition believes that non-performance penalties should be allocated and applied to a hydro resource on a portfolio basis, particularly when an asset is selling into both product categories (Base Capacity and Capacity Performance) and with multiple units in a portfolio, i.e., committed Base Capacity should be able to offset Capacity Performance penalty risk within a seller’s portfolio.

Finally, hydro resources should be able to utilize uncommitted portfolio resources on an hourly basis that are not transmission constrained to meet performance requirements and offset non-performance penalties. PJM should also allow the use of any Imports to also off-set non-performance penalties. Equal treatment should be given to internal generation and external resources – both of which contribute to reliability and competition in the capacity market.
VI. Conclusion

Hydro generators provide a diversity of fuel sources that PJM should be seeking and not penalizing. The PJM capacity markets have been effective in attracting new capacity resources like hydro and more should be done to retain and attract a more diverse resource base via the existing capacity construct. Pumped storage resources also provide the type of flexible, quick response that is valued during emergency peak conditions. Additionally, hydro resources play a critical role in balancing the emissions footprint of PJM’s generation portfolio. Unfortunately, the current Capacity Performance Proposal directly impacts the financial health of hydro and dissuades the future development of this asset class.