

Comments of Public Interest Organizations on PJM's Capacity Performance Proposal

September 17, 2014

I. Executive Summary

The undersigned Public Interest Organizations (PIOs)¹ welcome the opportunity to comment on PJM's Capacity Performance Proposal (Proposal). We concur with PJM staff that last winter, especially January 7, revealed vulnerabilities in the availability and affordability of specific types of generation in the footprint. Forced outage rates of 22% – and up to 30% for gas generators – are unacceptable. Uplift costs approaching \$600 million in one month are unacceptable. Involuntary load curtailment is unacceptable. For those reasons we agree that changes should be made to strengthen winter resource adequacy and reduce consumer costs.

The Proposal, however, is not a proportionate solution to the identified problem. Rather than a tailored solution to a specific issue: improving the performance and availability of the vast majority of under-performing resources last winter (*i.e.*, natural gas peaker plants and coal); it instead penalizes resources which performed well last winter, even when not required to do so (*i.e.*, demand response). It also penalizes other resources, such as energy efficiency, wind, solar, and energy storage, which have demonstrated capacity value. Rather than incentivizing more flexibility into the capacity market, as the Proposal apparently seeks to do, it actually fails to value flexibility. In short, while PIOs agree that PJM needs to take steps to strengthen winter resource adequacy, especially in the near term, PJM's proposed solution is overly broad and, in light of the numerous other changes PJM is implementing to decrease forced outages, unnecessary and costly to consumers.

In the near term, PIOs support an approach specifically tailored to the problem of reducing winter forced outages, especially from units with operational or fuel supply challenges. The elements of the Proposal that further this goal and are supported by the PIOs include the incentives to firm up gas through flexible means and strengthened penalties for nonperformance. We also support better alignment of the gas and electric markets, winter verification testing for all resources, and increasing the capacity value of wind power to accurately reflect its higher winter performance. Finally, we urge PJM to consider creating a winter demand response product to help meet winter resource adequacy.

In the longer term, we encourage PJM to prepare for significant changes occurring now on the grid. A combination of clean energy policies, new technology, and customer preferences are driving significant investment in lower-cost and clean renewable energy resources, rooftop solar, and other distributed generation and energy efficiency. A largely

¹ Environmental Defense Fund, Environmental Law & Policy Center, National Audubon, Natural Resources Defense Council, PennFuture Energy Center, Piedmont Environmental Council, Sierra Club, Southern Environmental Law Center, Sustainable FERC Project, and the Union of Concerned Scientists.

monolithic CP product that achieves resource adequacy at significant consumer cost, could frustrate consumer and policymaker choices. A better long-term approach would be to craft a cost-effective set of ancillary service and other product solutions to allow the market to accommodate different resource adequacy and reliability needs. This market construct will motivate investments in more flexible, firm resources, control costs, and meet system needs driven by public policies and consumer preferences.

We are now well into the early stages of this evolution. Within the next generation, renewable energy and energy efficiency will constitute a majority of resources in some regions of the country. With the advent of federal policies such as the Clean Power Plan and state/regional policies such as the Regional Greenhouse Gas Initiative, cleaner thermal resources, renewable energy, demand side resources, and energy storage will become dominant within the next generation. PJM's resource adequacy market – the Reliability Pricing Model (RPM) – will require changes to meet these future needs.

II. PJM's Capacity Performance Proposal – Based on Overly Conservative Resource Adequacy Needs

PJM is proposing to reorganize its capacity market by defining two categories of annual capacity market products: the Capacity Performance (CP) product and the Base Capacity product.² The Base Capacity product must satisfy the current Annual resource product requirements defined in the PJM Tariff and Manuals with some modifications, and the CP product is intended to be an “enhanced capacity product” with more stringent operating and performance requirements. Collectively, under PJM's proposal, the reorganized capacity market will consist of these two annual products as well as Limited and Extended Summer DR products. PJM is also proposing to cap Base Capacity along with Limited and Extended Summer DR at an estimated 10-15% of total cleared resources.³

The CP product will need to meet the following criteria:

- A generator must have on-site fuel (or dual-fuel backup capability) and be capable of at least 16 hours of continuous operation per day for three consecutive days at its committed Installed Capacity.
- Generators that burn gas only must have a secured fuel supply with some combination of firm transport, firm commodity and access to storage or equivalent to provide flexible operation during peak gas-usage conditions.
- Energy efficiency plans must be installed and able to reduce demand throughout the entire year.
- Annual Demand Response must be available 24 hours a day, 365 days per year, and for 72 continuous hours.

² PJM's Capacity Performance Proposal, <http://www.pjm.com/~media/documents/reports/20140820-pjm-capacity-performance-proposal.ashx> (“Proposal”).

³ Proposal at 18.

- The Capacity Performance Product also has performance assurance, high availability, and flexibility requirements, with significant penalties (up to 2½ times the annual capacity payment) for non-availability when called upon.

PJM’s proposal is motivated in large part by the events occurring during the January 2014 polar vortex conditions. On January 7, 2014, approximately 22% of PJM capacity was unavailable. Of the generating resources, natural gas performed the worst, with up to 30% of gas-fired generation in forced outage conditions during this period. PJM’s Michael Kormos testified at FERC that the January 2014 weather events and the number of forced outages were very unusual:

PJM, in its nearly 87-year history, has never experienced the prolonged cold weather of January 2014 across its footprint. Eight of the ten highest winter demands for electricity in the PJM region occurred in January 2014. PJM’s new all-time winter peak load of 141,846 megawatts was recorded the evening of January 7, 2014. . . .

Moreover, the forced outage rate experienced during this time was two to three times higher than the normal winter outage rate of around seven to ten percent and at levels not seen since 1994.⁴

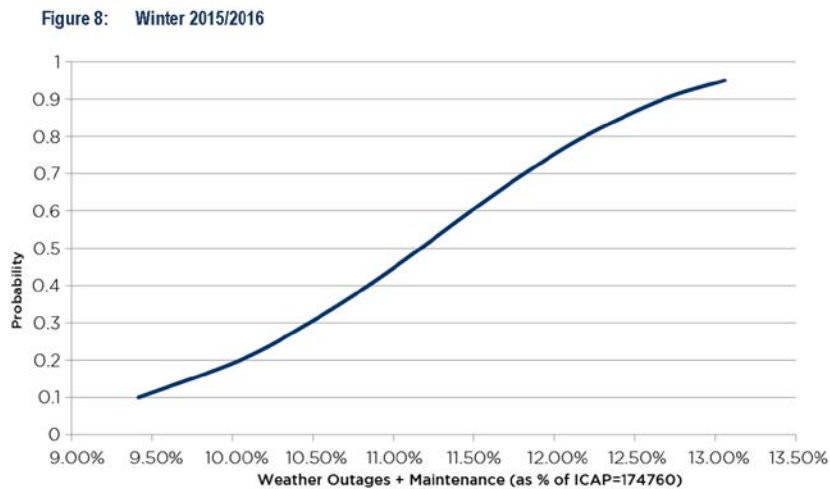
Looking ahead, PJM’s focus of concern is that in the winter of 2015/2016, a comparable rate of generator outages (22%), coupled with extremely cold temperatures and expected coal retirements, could prevent PJM from meeting its peak load requirements.⁵ PJM justifies the CP proposal on its analysis of the alleged need for the CP product, which PJM calls its Loss of Load Expectation or “LOLE” analysis, which uses the following assumptions:

1. PJM experiences a 90/10 winter peak load level, one that has a probability of occurrence once every ten years (which PJM states is consistent with the actual load experienced on 1/7/2014);
2. PJM winter generation reserves include all generators within the PJM footprint and external generators that have committed to PJM through RPM or FRR; and
3. Demand Resources (DR) are not available in the winter.

⁴ See Michael Kormos testimony at the FERC Technical Conference April 1, 2014 (“Kormos Testimony”) at 2-3, available at <http://www.pjm.com/~media/documents/reports/20140331-testimony-of-michael-kormos-regarding-polar-vortex-ferc-20140401.ashx>. See also Mike Kormos Presentation at the FERC Technical Conference April 1, 2014 (“Kormos Presentation”) at 6 (top chart) (indicating that the 22% of forced outages on January 7th was much higher than the 7% historical average), <http://www.pjm.com/~media/documents/reports/20140331-presentation-of-michael-kormos-regarding-polar-vortex-ferc-20140401.ashx>.

⁵ See Proposal at 4.

Problem Statement at 15. Based on these assumptions, PJM calculated the increased risk of not meeting the target LOLE of 0.1 (1 day in 10 years) in the winter of 2015/16⁶:



This graph illustrates that if there is 9.5% increase in forced outages *above* the expected winter forced outages of 7% (*i.e.*, total forced outages of 16.5%), there is approximately a 10% chance of exceeding the target LOLE of 0.1. *See* Problem Statement at 15 and 17. PJM is concerned that if the winter forced outages exceed 16.5%, the LOLE will rise, as shown on the above graph. *Id.* Based on the 10% risk threshold, PJM is proposing that the market clear sufficient CP resources to avoid exceeding that 10% limit. Other resources will comprise the remainder of the market, likely not to exceed 10-15%.⁷

Put another way, winter resource adequacy will be acceptable – even if PJM experiences another weather event that “has a probability of occurrence once every ten years” *and* no DR is available *and* PJM gets few imports from outside regions – if PJM can reduce its winter forced outage rate to 16.5% in 2015/16 (which is more than double the average forced outage rate of 7%).⁸

⁶ *See* Problem Statement at 15-17, Fig. 8.

⁷ *See* Proposal at 18 (the “aggregate amount of the Base Capacity, Limited DR and Extended Summer products will be in the 10-15 percent range”, meaning that the other 85-90% would be the newly-proposed Capacity Performance product).

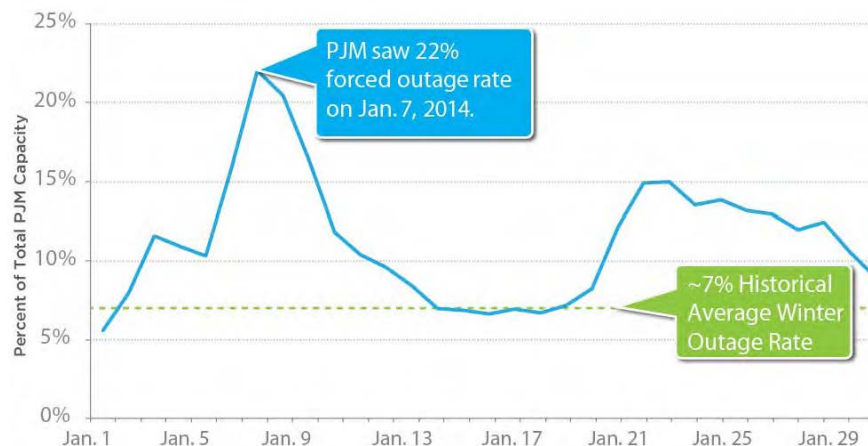
⁸ PJM’s LOLE concerns focus on the winter of 2015/16, and these concerns only arise if PJM experiences another rare winter weather event, significantly higher than normal forced outages, and few power imports from other regions. *See* Problem Statement at 15-17. PJM has not expressed a LOLE concern for this upcoming winter. In fact, PJM’s states that “should a Polar Vortex event occur again in the winter of 2014/15 (a 10 percent probability event), PJM may be at an acceptable level of loss of load risk given the generation reserves that are committed for the 2014/15 Delivery Year.” Problem Statement at 15.

III. PIOs' Assessment of PJM's Proposal

A. Generators quickly improved performance last winter and efforts outside of this proposal are underway to further reduce outages

While last winter's record and prolonged cold was severe by any measure, generators quickly adapted, and by the end of January, reduced forced outages from the 22% experienced on January 7 to levels that would ensure resource adequacy (15% and lower) according to PJM's LOLE analysis.⁹

Figure 15: Generator Outage Rate – January 2014



Thus, even if we experience another unusually cold winter, coupled with no available demand response and few imports (PJM assumptions used to craft the CP proposal), generating resources should be available at acceptable forced outage rates.

In addition, PJM is working to reduce forced outages and procure additional capacity before the winter of 2015/2016, further eroding away PJM's justification for the stringent requirements in the Proposal. These efforts are listed in the **Appendix** and include better alignment of gas and electric markets, new winter reliability testing requirements, altering the Variable Resources Requirement curve to procure more generation, and lifting energy market offer caps.

B. Resource adequacy will improve after 2015/16

Significantly, PJM's proposed redesign of its capacity market is largely based on the winter of 2015-16. The RPM results show that generation capacity will increase after the winter of 2015-16:¹⁰

⁹ PJM's May 8, 2014 Analysis of Operational Events and Market Impacts During the January 2014 Cold Weather Events ("PJM's Analysis of January 2014 Cold Weather Events") at 24, Figure 15, available at <http://www.pjm.com/~media/documents/reports/20140509-analysis-of-operational-events-and-market-impacts-during-the-jan-2014-cold-weather-events.ashx>. See also Problem Statement at 17, Figure 8 and at 15.

¹⁰ See Kormos Presentation at 13, (top chart); Problem Statement at 19, fig. 10 (bottom chart).

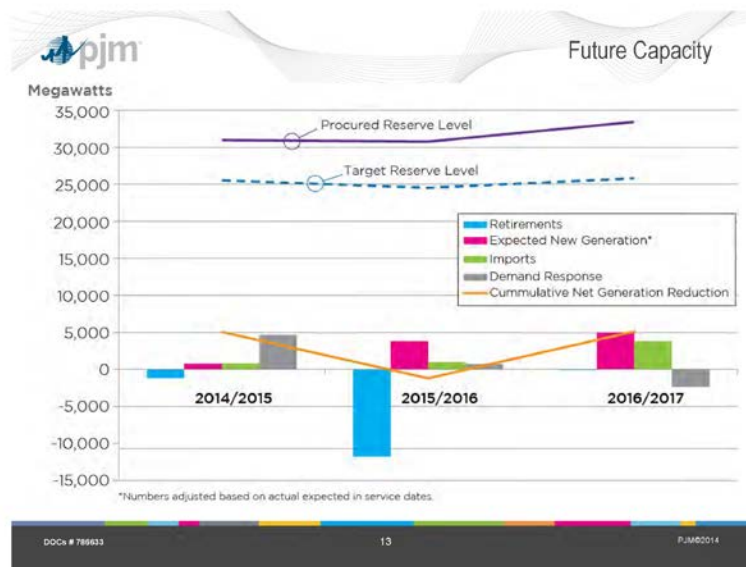
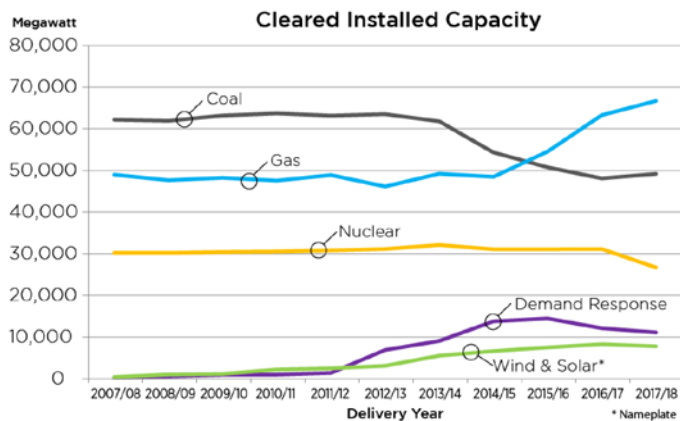


Figure 10: Cleared Installed Capacity



C. The Proposal undervalues demand response

Voluntary demand response resources responded during this past winter.¹¹ Among the attributes of DR are that its response rate is on par with many generators, and it does not face the fuel supply and performance challenges of some generation during the winter. To create disincentives to a resource that provided the reliability PJM seeks in the specific

¹¹ See PJM’s Analysis of Operational Events and Market Impacts During the January 2014 Cold Weather Events supra at 19. Although Demand Response was not required to respond in January 2014, PJM called on “voluntary” Demand Response on a number of occasions. On January 7, 2014, PJM called for Demand Response twice. Approximately 4700 MWs total responded after the calls. *Id.* “The responding, voluntary demand response resources, while only about 20 percent of the demand response capacity, performed very well...[and] helped PJM successfully meet an all-time record winter peak of 141,846 MW at 7:00 p.m. January 7 with no reliability issues.” *Id.*

scenario PJM intends to address undermines the intended goal. Therefore, rather than essentially disqualifying DR from CP eligibility, PJM instead should incent more DR and consider creating a winter DR product.

We understand PJM's position that DR should be available as an Annual (or Base) resource. DR, however, is not generation; its providers are business and residential customers who consume energy. Comparable treatment does not mean equivalent treatment, and insisting on equivalency undervalues affordable and dependable resource adequacy solutions that contribute to just and reasonable rates, and may be undue discrimination. DR resources that can commit to Annual resource performance requirements should do so, and PJM also should encourage other DR products to meet seasonal demands, including the winter peaking period.

D. The cap on Non-CP resources is far too low

PJM's plan to cap Base Capacity along with Limited and Extended Summer DR collectively at an estimated 10-15% is based on the wholly unjustified assumption that *no* Base Capacity resources will be available during the winter peak period, whenever that occurs.¹² This is unjustified and is contradicted by the performance data from last winter, when generation which would qualify as Base Capacity but would not qualify as the new CP product (such as wind, DR, gas generation without dual fuel or firm supply contracts, run-time limited generation) performed during the polar vortex¹³.

In addition to a problematic rationale and calculation method for the cap, the underlying assumptions are conservative, resulting in a low cap of 10-15% on Limited and Extended DR plus Base Capacity. In comparison, the cap on Limited and Extended Summer DR alone is at about 6.5% of the target capacity level for the 2017/18 Base Residual Auction.¹⁴ Thus, if Base Capacity (essentially all of the Annual products that do not qualify as CP) exceeds 3.5 to 8.5%, Base Capacity plus Limited and Extended Summer DR could easily exceed a total cap of 10 to 15%. This result would shut out of the capacity market many resources useful in meeting demand during January 2014 (including some wind and DR), and all other resources that performed during the January 2014 severe weather events that cannot qualify as CP products).¹⁵ Under the CP proposal, most of these important resources would be shut out of the capacity market, producing an

¹² Although PJM states that its Proposal is based on the assumption that "some portion" of Base Capacity is unavailable during the winter peak period (Proposal at 17), PJM staff stated at its September 11, 2014 Capacity Performance Meeting that PJM's proposal for capping Base Capacity plus Extended Summer and Limited DR assumes that no Base Capacity will be available during the winter peak. PIOs would appreciate clarification from PJM on whether our understanding of PJM's position remains correct.

¹³ See, e.g., *infra* note 16 on wind performance and *supra* note 11 on voluntary DR performance during the polar vortex.

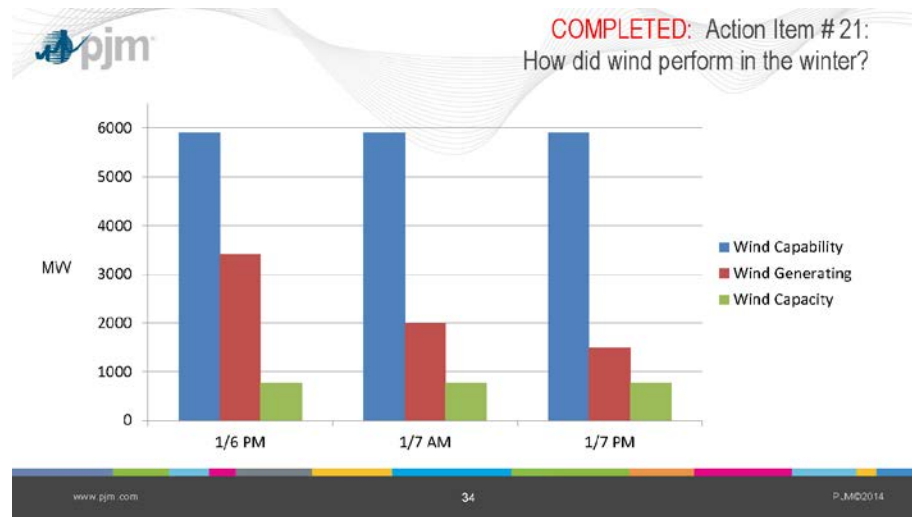
¹⁴ The 6.5% cap on DR is derived from dividing the 11,441 MW Sub-Annual DR Constraint (which includes both Limited and Extended Summer DR caps) by the 175,311 MW Target Capacity Level from Table 5 of the 2017/2018 RPM Base Residual Auction Planning Period Parameters, <http://www.pjm.com/~media/markets-ops/rpm/rpm-auction-info/2017-2018-rpm-bra-planning-parameters-report.ashx>.

¹⁵ See *infra* note 16 on wind performance and *supra* note 11 on voluntary DR during the polar vortex.

artificially high price for much more CP than is needed, a perverse effect of a rule meant to ensure reliability during winter peak demand.

E. The Proposal undervalues wind generation

As shown in PJM’s chart below, wind generation during the polar vortex (shown in red) performed much better than its capacity credit (shown in green).¹⁶



Some might argue that wind’s variability means that even though there was high wind output during the polar vortex days, wind cannot be reliably depended on for future events. To the contrary, the contribution to planning reserves from wind in PJM is set based on the capacity factor in the summer when wind speeds are at their annual minimum. If PJM set seasonal reserve margin contributions for wind, they would be much higher in the winter and shoulder months when wind speeds, driven by the atmospheric thermal gradients, are highest. Therefore the resource adequacy contribution of wind is actually undervalued with respect to meeting winter peaks and the capacity factor observed during this last January illustrates that fact. PJM should be incenting more wind generation – instead of less – to help with winter peak demand, and it should increase wind’s capacity factor in planning for winter peak demand.

F. The proposal undervalues energy storage

PJM’s proposal could significantly limit the development of next-generation energy storage (ES) technologies. PJM already is beginning to use ES ancillary services to support grid reliability, and ES could become a vital tool for managing reliability and resource adequacy in the future. PJM’s requirements for ES are likely to preclude it from qualifying as a CP resource. Ironically, PJM has started the process for ES to qualify for the RPM; the new proposal is likely to set back those efforts.

¹⁶ See PJM’s Capacity Performance Action Items at Action Item #21, p.36 <http://www.pjm.com/~media/committees-groups/committees/elc/postings/capacity-performance-action-item-presentation.ashx>.

ES is a good example of one of our most significant concerns with PJM's proposal, which is that there seems to be little basis for changing performance requirements on resources that don't face fuel or weather risks. Assuming that ES meets relevant verification and testing requirements, and is subject to the same non-performance penalties as other resources, it should be considered a dependable annual resource. We are especially concerned that the 16-hour requirement is arbitrary; shorter duration resources remain valuable during winter peak conditions.

If PJM proceeds to create a CP product, we support the Energy Storage Association's (ESA) proposal to create a Short Duration, High Availability (SDHA) subcategory within CP resources. ESA's proposed minimum requirements include unlimited starts per day, ability to provide four hours of continuous energy at the rated ICAP and recharge for an unlimited number of days, and startup and notification time less than 10 minutes. ES resources meeting these and the other standards ESA proposes would support PJM's flexibility goal for meeting winter reliability needs: "PJM values resource flexibility especially on peak winter days The ability for resources to be flexible throughout an operating day is integral to efficiently dispatching the system and minimizing uplift."¹⁷ With the changes ESA recommends, ES technologies can significantly reduce uplift and reduce consumer costs, and we encourage PJM to adopt them.

G. The Proposal undervalues energy efficiency

Energy efficiency (EE) resources have demonstrated capacity value in PJM's capacity market. They are reliable, most EE is virtually immune to weather variables, and is also often the least-cost solution. A new Brattle report on the accounting of energy efficiency in PJM's load forecast reveals additional opportunities for energy efficiency resources in PJM markets and planning, *including EE resources already in existence or which will be implemented in the future.*¹⁸ For that reason any additional rules for energy efficiency should facilitate rather than restrict the resource. Rather than creating a one size fits all definition for the resource, which will preclude seasonal efficiency projects, PJM should consider leaving the current comparatively flexible capacity market as is and/or consider creating seasonal EE products. Some EE projects have benefits in the winter, including for example electric heat. Other projects, such as air conditioning, have summer peak reduction benefits. Other resources, such as energy efficient lighting, may have higher capacity factors in the winter than in the summer. A seasonal resource EE category would recognize and reward the resource adequacy value of these resources rather than consigning them to the lower-value Base product.

¹⁷ Proposal at 23.

¹⁸ You can access this report at <http://bit.ly/1qZxLyy>, or in the News section of www.sustainableferc.org.

H. The Proposal creates a substantial new market power problem and facilitates strategic behavior

The Proposal could introduce market power issues that likely will increase prices for consumers and produce unjust and unreasonable rates. In particular, many capacity sellers, to offer the enhanced CP product, will have to make investments, and they will face stiff penalties for nonperformance. Sellers must be able to reflect these investment costs and potential penalties in their offers, and they must have the flexibility to not offer capacity as CP if it cannot meet the stringent requirements at reasonable cost and risk. But sellers with large portfolios will have strong incentives to offer a portion of their portfolios as CP only at a high price, and to not offer a portion of their portfolios as CP at all, in order to support higher clearing prices for CP that would be earned by the remainder of the portfolio. Because there are many reasons why a seller would not want to offer capacity as CP, or only at high prices, this strategic behavior would be virtually impossible to identify and mitigate.

IV. Recommendations

A. PIOs support solutions appropriately tailored to the identified problem

PIOs support PJM's goal of improving the performance of resources already committed in the capacity market. For that reason, we urge PJM to focus on the resources which did not perform well and the underlying drivers (such as gas availability, coal piles freezing, or design/maintenance issues). We recommend the following actions for the near-term:

- Incentives to assure fuel supply through firm gas transportation or equivalent means – PJM is proposing this to apply to all resources.
- Winter verification testing.
- Reasonable maintenance and/or design changes to reduce forced outages during extreme cold weather events.
- Strong penalties for non-performance, such as by incorporating elements of ISO-NE's pay-for-performance rule changes.
- A winter demand response product to help meet winter resource adequacy needs.
- Higher capacity factor values for wind in the winter season.

B. Recommendations for anticipating and addressing upcoming needs

Looking beyond next winter, we encourage PJM to establish rules that will enable the capacity market to more nimbly respond to significant upcoming changes in grid needs. Specifically, clean energy policies, new technology and customer preferences are driving significant investment in renewable energy, distributed generation and energy efficiency. Implementing a monolithic CP product at significant consumer cost to achieve resource adequacy will stunt these forward-looking investments and frustrate public policies and consumer preferences. A more granular approach offering products that can help a more diverse set of resources meet resource adequacy and reliability will better serve long-term grid needs and is more consistent with the evolution of our resource mix.

V. Conclusion

Please do not hesitate to contact any of the undersigned if you have questions or comments about these comments. We look forward to continuing this discussion.

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Appendix: Efforts underway to reduce forced outages in time for Winter 2015/16 and beyond

As set forth above, if PJM can reduce its forced outages to below 16.5% for the winter of 2015/16, resource adequacy should be well within PJM's target (i.e., a loss of load expectation of 1 event in 10 years, or less).

As a result of the January 2014 winter events, numerous efforts are already underway to reduce forced outage rates at PJM generation plants by targeting some of the underlying problems contributing to these outages, and incenting additional generation capacity, including the following:

- PJM's Operating Committee investigated the need to develop verification/testing requirements to ensure that resources such as traditional generation, variable generation, demand response and those that operate infrequently and/or have alternate fuel capability are prepared to operate during extreme cold weather conditions, and also considered guidelines for the use of a cold weather preparation checklist.¹⁹ The Committee created a proposal to enhance unit performance during cold weather conditions and schedule units to meet systems conditions reliability and economically. *Id.* at 2.²⁰
- The Operating Committee is looking at improving gas unit commitment and coordination to improve the clarity, transparency and standardization of handling long-lead gas unit commitment, due to fuel restrictions and consider tools, processes, market construct, as well as communication and notification protocols
- Pursuant to a FERC Notice of Proposed Rulemaking, PJM and others are working on gas/electric industry coordination. *Id.* at 7.

¹⁹ See Cold Weather Recommendation Status Summary at 2, <http://www.pjm.com/~media/committees-groups/committees/mc/20140915-webinar/20140915-item-02-hot-and-cold-weather-recommendations-update.ashx>.

²⁰ *Id.* The proposal is as follows:

“1. Generation Resource Cold Weather Checklist to be added as Attachment N to Manual 14D. The checklist, or a similar one developed and maintained by the generation owner, should be used annually prior to the winter season to prepare generation resources for extreme cold weather operations. Section 7.5.2 of M14D details the procedures.

2. Generation Resource Operational Exercise. A new section 7.5 will be added to Manual 14D. The exercise will be conducted prior to the onset of cold weather with the purpose of identifying and correcting start-up, operational and fuel switching problems. Not every unit will be exercised. Nuclear, wind and hydro units are excluded. PJM will provide a list of units to resources owners that have not run recently on either the primary or backup fuels. Section 7.5.1 of M 14D details the procedures.” See Operating Committee – Special Cold Weather Resource Improvement Final Proposal Report September 4, 2014 at 2, <http://www.pjm.com/~media/committees-groups/committees/oc/20140917/20140917-cold-weather-resource-improvement-proposal-report.ashx>.

- The Operating Committee is working with the generation owners to identify opportunities to create or improve information sharing such as fuel source and limitations, emission limitations, as well as use and validation of outage types. *Id.* at 6.
- PJM is analyzing and reviewing energy market offer caps, and is expected to shortly file with FERC a request to lift energy market offer caps. *See, e.g., id.* at 8.
- PJM is working on improving data sharing with the gas industry and interregional coordination. *Id.* at 8.
- PJM developed a tool (which is now in the testing phase) to confirm external capacity resources availability, day-ahead and real-time market commitments, and actual performance. *Id.* at 11.
- PJM has reviewed and enhanced the tools and processes for accepting Emergency Energy Bids. *Id.* at 15.
- The PJM Planning Committee has started to perform a new winter-focused transmission reliability study. *See, e.g.,* Winter Peak Study Update at pages 100-108, <http://www.pjm.com/~media/committees-groups/committees/teac/20140807/20140807-teac-reliability-analysis-update.ashx>.
- The PJM board recently announced that it will be filing with FERC a request to alter the Variable Resource Requirement (VRR) curve, which will procure more capacity. *See, e.g.,* <http://www.pjm.com/~media/documents/reports/20140910-pjm-board-statement-regarding-the-2014-rpm-triennial-review.ashx>.