UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

PJM Interconnection, L.L.C.) Dockets Nos. ER05-1410-000 & EL05-148-000

POST-TECHNICAL CONFERENCE COMMENTS OF COALITION OF CONSUMERS FOR RELIABILITY

I. INTRODUCTION

Pursuant to the Commission's May 1, 2006 Notice of Staff Technical Conference, the Coalition of Consumers for Reliability ("CCR")[1] hereby submits its post-Technical Conference comments in response to several points raised during the June 7 and 8, 2006 Conference. The Commission narrowed the issues to be explored at the June 7 and 8 Staff Technical Conference to two components of PJM's Reliability Pricing Model ("RPM"), *i.e.* the Variable Resource Requirement, or Demand Curve; and the Long-Term Fixed Resource Adequacy Requirement, or Opt-Out Option.[2] These Post-Technical Conference Comments address both issues.

At the outset, CCR notes that it opposes both RPM as filed and the Commission's Order approving the core aspects of same. CCR has sought rehearing of the Order, both on substantive grounds and because the Commission erred in accepting RPM without establishing a meaningful hearing process. Notwithstanding its opposition to the Order

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[1] For purposes of these Comments, CCR consists of the following entities: Pennsylvania Office of Consumer Advocate; Maryland Office of People's Counsel; Office of the People's Counsel for the District of Columbia; Office of the Ohio Consumers' Counsel; Old Dominion Electric Cooperative; North Carolina Electric Membership Corporation; Delaware Municipal Electric Corporation; Allegheny Electric Cooperative, Inc.; Borough of Chambersburg, Pennsylvania; Illinois Citizens Utility Board; and Southern Maryland Electric Cooperative, Inc.

[2] *See PJM Interconnection, L.L.C.*, 115 FERC ¶ 61,079 (2006)("Order") at Appendix A.

and RPM as filed, CCR files these Comments because the technical conference forum is the only opportunity provided by the Commission for parties to address the Variable Resource Requirement and the Fixed Resource Adequacy Requirement.

II. COMMENTS

A. Variable Resource Requirement

1. The Commission Must Not Rely on PJM's Flawed Analysis for Support of the Demand Curve

The attached comments by Ezra Hausman, consultant to the Pennsylvania Office of Consumer Advocate, conclude that the model used by PJM as a foundation for the proposed Variable Resource Requirement (VRR) curves is a poor representation of market conditions in PJM, and that it therefore cannot be relied upon as the basis for setting curve parameters under RPM. In particular, PJM has used a strictly financial model related to new investment and ignores critical determinants of investment decisions such as site availability and access to transmission lines and fuel. PJM fails to take into consideration that incumbent generation owners may have a much stronger incentive *not* to build so that high capacity prices are preserved. PJM's analysis also assumes, when conditions are right, that there will be an extremely high level of new entry. In the end, PJM's incomplete and, in places, erroneous assumptions lead to incorrect conclusions about how markets will perform. The result can be reliability that is lower than PJM assumes and prices that are much higher and for longer periods. PJM must extend and correct this analysis before it can be relied on as a basis for the proposals that the Commission has accepted in its April 20 Order.

2. The Inflection Point Right of IRM under RPM is Excessive

The inflection point on the demand curve should not be set at one percentage point above a reasonable planning installed reserve margin (IRM), as is proposed for PJM's VRR. The additional 1% is unjust and reasonable in that it requires an additional 1600 MWs of capacity (or $800 million or more in capital) based on unrealistic modeling assumptions. This parameter is based on PJM's assertion that the Hobbs' analysis validates IRM plus 1% as the more stable and lower cost alternative among demand curve design parameters. PJM and Mr. Hobbs' conclusion is unrealistic in that it assumes that RPM does not adjust as capacity conditions change.

However, the actual structure under RPM differs from the theoretical assumption in the model[3]. Under RPM, if the resulting actual resource needs come in lower than what PJM procured under the primary auction four-years prior, then load is financially responsible for all the unnecessary excess capacity purchased in the forward auction. If the resulting resource needs are greater as a result of a later higher load forecast than what had been projected in the primary auction four-years prior, then PJM in a later auction attempts to procure the additional resources on behalf of load to address the shortage. Reality and model assumption differ in practice, and so do their associated cost impacts. Mr. Hobbs' analysis does not accurately model these results and cannot serve as

[3] As described in the RPM Filing Transmittal Letter 8/31/2005 pages 52-55, under RPM, if the system wide shortfall is more than 100 MW as a result of a higher load forecast, then PJM via the Second Incremental Auction held 13 months prior to the start of the Delivery Year attempts to procure additional resources on behalf of load. There are also First and Third Incremental Auctions, held 23 and 4 months respectively prior to the Delivery Year, in order to allow individual participants to more directly adjust their supply positions. Unlike RPM, the model assumes that once actions are taken 4-years prior then individual participants become passive actors without the ability later take later additional corrective action based on better information.

a basis for making decisions on the appropriate parameters for a demand curve in this case.

3. The Commission Should Modify the Parameters of the RPM Demand Curve.

Additionally, in adopting RPM, PJM glossed over and ignored the first 10 years of the Hobbs analysis. Mr. Jonathan Wallach, speaking on behalf of CCR and the Maryland Office of People's Council at the June 7 Staff Technical Conference, described the very expensive result produced by RPM in the first ten years. *See* Prepared Statement of Jonathan F. Wallach on Behalf of The Maryland Office of People's Counsel 4-5; Tr. at 164-65; 171-72. Mr. Wallach explained that the current excess of capacity in PJM over and above the level required to satisfy IRM will receive the high clearing prices under RPM's proposed demand curve, a model designed to clear excess capacity at a price that far exceeds the value of that excess to consumers. *Id.* These excessive payments by consumers during periods of excess supply are counter-intuitive to fundamental principles of supply and demand. Mr. Wallach provided suggestions for mitigating the unreasonable results of RPM in the first ten years through changes to several of the RPM demand curve parameters. Prepared Statement of Jonathan F. Wallach at 5-7. CCR strongly encourages the Commission to adopt these modifications if the Commission continues to pursue RPM over CCR's objections. Mr. Wallach's comments before the Commission further demonstrate that PJM's 100 year modeling analysis is neither reasonable nor reliable, as forecast error grows the longer one forecasts into the future. Tr. at 155.

4. The June 7 Staff Technical Conference Demonstrates The Need for Setting RPM for an Evidentiary, Trial-Type Hearing.

The flaws in Dr. Hobbs' analyses demonstrated in both Dr. Hausman's and Mr. Wallach's testimony, as well as the numerous factual issues discussed during the June 7 Staff Technical Conference, demonstrate the need for a full factual inquiry into the components of RPM as advocated by CCR in its Request for Rehearing and its Protest filed in these dockets. Many of the panelists at the June 7 conference spoke at length of the need to make numerous factual findings in determining the appropriate parameters of a demand curve, such as (a) the cost of new entry ("CONE") (including factual findings as to the appropriate measure for such costs, *e.g*. the propriety of using reactive power filings as a basis for CONE, and the location for which that cost is determined) (Tr. at 56-57, 77, 168-69); (b) the appropriate determination of energy and ancillary service revenues (including the age of the unit used as the basis for the estimate, the assumed surplus conditions at the time the estimate is made, and the use of historical data or forecast data to establish this estimate) (Tr. at 57, 114-15); and (c) the slope and height of the demand curve (including the best proxy for assessing the value of lost load).

Genuine issues of material fact are in dispute as to each parameter of the demand curve that can best be sorted out through an evidentiary, trial-type hearing with the opportunity for full discovery. At a minimum, the Commission should adopt the modifications and recommendations for mitigating the adverse impacts of the RPM demand curve as discussed by Dr. Hausman and Mr. Wallach.

B. Long-Term Fixed Resource Adequacy Requirement

1. Any Opt-Out Option Must Be Meaningful and Widely Available to All LSEs.

Several parties participating in the June 8 Staff Technical Conference, most notably PJM, Exelon Corporation, The Mirant Parties, Consolidated Edison Company and Dr. Roy Shanker speaking on behalf of several generation entities, advocated restrictive parameters for any option that would allow LSEs to opt-out from RPM, including restrictive eligibility requirements, restrictive length of contract term requirements and restrictive reserve margin requirements.[4] Exelon recommended that the Commission restrict eligibility for use of the opt-out option to load serving entities ("LSEs") in non-retail choice states (Tr. at 301), other opponents of the opt-out option recommended an 8 to 10 year contract length term and a resource adequacy requirement based on peak load plus IRM plus 3%. Tr. at 267, 302. American Electric Power Service Corporation ("AEP") and The Dayton Power and Light Company ("Dayton"), on the other hand, recommended more modest parameters for the opt-out option, including allowing wide eligibility for use of the opt-out option by all LSEs, a four or five year contract length term and a resource adequacy requirement based on peak load plus IRM.[5] CCR supports a long-term fixed resource adequacy requirement along the more modest lines recommended by AEP and Dayton.

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[4] *See, e.g.* Position Statement of Exelon Corporation for Technical Conference on RPM; Prefiled Technical Conference Comments on Panel 2 Issues by Robert B. Stoddard on Behalf of The Mirant Parties; Comments of Consolidated Edison Energy, Inc. on the Long-Tem Fixed Resource Adequacy Requirement; Affidavits of Panelists Appearing on Behalf of PJM Interconnection, L.L.C. Comments of Dr. Roy Shanker on behalf of PSEG Companies, FPL Energy L.L.C., Reliant Energy Inc., Constellation Energy, and Dominion Resources Services Inc.

[5] *See, e.g.* Comments of American Electric Power Service Corporation and Comments of the Dayton Power and Light Company. *See also* Tr. at 268, 270.

Any opt-out option must provide LSEs a meaningful opportunity to manage their supply resources and loads. To be meaningful, eligibility for the opt-out option must be widely available to any LSE capable of managing its supply portfolio to serve its load. Those who argued for more restrictive eligibility requirements placed great emphasis on the need to narrow the pool of LSEs eligible to opt-out of RPM so as not to destroy the price signals they hope RPM will send as to the need for new generation investment in PJM. Tr. at 267-68, 279-80, 304, 401, 419. However, the main goal in revising PJM's existing capacity market structure should be to ensure long-term resource adequacy by encouraging long-term bilateral contracts rather than simply requiring all parties to transact for capacity through RPM. Competitive markets should be about choice among a series of options where sellers and buyers bid for capacity through an auction or a bilateral contract process, rather than a forced central procurement auction based on an administratively determined demand curve.

If the long-term fixed resource adequacy requirement is to be a meaningful alternative to RPM, any LSE should be able to use this option to satisfy its requirements. Those opposing the opt-out option seek to impose parameters on the opt-out options sufficiently restrictive to make the option similar in nature to the parameters of RPM itself. Only by making the opt-out option as equally unattractive as RPM can they assure that sufficient capacity will trade in RPM to make it a viable market. However, making the opt-out option as equally unattractive as RPM effectively destroys its value as a true alternative to the onerous and costly results that will be produced by RPM.

CCR has described in detail the reasons RPM is unjust and unreasonable, not the least of which is the $5 to $12 billion price tag associated therewith. The Commission

must ensure that LSEs have a real alternative to managing their supply, load and overall costs through a viable bilateral contract option. Merely transferring the onerous features of RPM onto the long-term fixed resource adequacy requirement option will not achieve that goal, but rather will merely ensure that all capacity does in fact trade through RPM, thus discouraging bilateral contracts for capacity.

The opponents of a realistic opt-out option argue to limit eligibility to only vertically regulated utilities in non-retail choice states. Tr. at 301. However, conditions in retail choice states may well be indistinguishable from conditions in non-retail choice states where most retail customers choose to remain with the incumbent utility supplier, *e.g.* Ohio. Tr. at 306. Additionally, utility generation in retail choice states may be serving wholesale customers under 20 year contracts. Id. The Commission must also consider the balance between capacity commitment certainty and the disadvantages of forecast error in long-term forward procurement requirements. Tr. at 271.

Providing the advantage of the opt-out option to only a select group of LSEs based on whether their state laws or rules allow retail choice would result in undue discrimination. At a minimum, the Commission must recognize that many municipal and electric cooperative LSEs are similar in nature to these vertically integrated utilities in non-retail states since the retail customers served by many municipal and rural electric cooperative likewise do not have, or have only rarely (if at all) exercised retail choice. This is equally true in retail choice and non-retail choice states. Hence, CCR supports the comments of Mirant that municipal and electric cooperatives also should be allowed to manage their long-term supply portfolios and load obligations through an opt-out option

if the Commission adopts a restrictive approach to eligibility for the opt-out option. Tr. at 326.

The ability to self-supply by bidding into the annual RPM Base Residual Auction does not remedy CCR's concern with the need for a broad eligibility parameter in a long-term fixed resource adequacy requirement. First, RPM requires all LSEs to obtain unnecessarily excessive quantities of capacity since the demand curve is designed to clear on average at IRM plus 3%. Consequently, any LSE bidding its self-supplied capacity into the RPM auction will still be required to obtain more capacity than required to satisfy the approved IRM requirement. Second, the clearing prices produced by RPM auctions will undoubtedly affect bilateral contracts, whether bid into the RPM auctions or entered into under the opt-out option. Dr. Shanker's comments at the June 8 Staff Technical Conference that the opt-out option will impede the price signals produced by RPM (Tr. at 267-68) demonstrates the link between RPM clearing prices and bilateral contracts. The opponents of the opt-out option want bilateral contracts bid into the RPM auction so that a single clear price signal is sent to investors. The only way this can happen is by requiring all capacity, including bilateral contracts, to trade through the RPM auctions, thus allowing the RPM auction clearing price to temper prices even in bilateral contracts. [6] In order to avoid the onerous and costly result of RPM, a meaningful long-term fixed resource adequacy requirement must be available, even though it too is likely to be influenced by RPM prices. Tr. at 66-67.

[6] This argument effectively proves the concern expressed by CCR in its Protest to RPM filed in this docket in October, 2005 that RPM will discourage bilateral contracts. The intent of RPM is to encourage all capacity to trade through the auction so as to send a price signal to investors that excess capacity is valued in PJM and investment will be abundantly rewarded.

Finally, the Commission should not adopt the RPM approach of requiring capacity over and above peak load plus IRM when establishing this parameter of the long-term fixed resource adequacy requirement. PJM has determined, through a conservative process, that a reserve margin of 15% adequately protects resource adequacy needs. Indeed, state regulators have operated successfully for many years on the basis of requiring only sufficient capacity to meet peak load plus IRM. PJM's analysis of IRM is conservative, both in its assessment of the appropriate requirement and in its selection of the actual IRM requirement since PJM has in recent years always rounded up from the 14.5% reserve margin produced by the assessment to the 15% reserve margin requirement built into the existing capacity market structure. RPM would on average add another 3% reserve margin on top of PJM's already conservative requirement. The Commission should not adopt a long-term fixed resource adequacy requirement premised on the same locked in excessive level of capacity built into RPM, but should provide LSEs a meaningful alternative in the form of PJM's documented and reasonable 15% reserve margin.

2. Both Owned and Contracted Capacity Should Be Eligible to Qualify as Self-Supplied Capacity in the Long-Term Fixed Resource Adequacy Requirement Option.

The Commission should clarify that both owned and contracted capacity should be eligible to satisfy the long-term fixed resource adequacy requirement. Whether an LSE owns generating capacity or has a long-term bilateral contract for such capacity, the LSE is able to demonstrate that it has sufficient resources to satisfy its obligations under an opt-out option. No party has advanced sufficient reason for eliminating bilateral contracts for capacity from the pool of resources eligible to satisfy long-term resource

adequacy obligations. Further, there should be no limitation on the ability of an LSE that self-supplies its capacity from selling its capacity to third parties. Instead, an LSE with excess capacity after satisfying its own long-term fixed resource adequacy requirement should be permitted to make such excess capacity available to the market just as it would be able to absent exercising the option to self-supply.

3. The Length of the Contract Term Should Not Inhibit Participation by Demand Resources.

The proposal for an 8 to 10 year contract term for the long-term fixed resource adequacy requirement will effectively prohibit LSEs from being able to use demand resources to satisfy capacity obligations. The exchange between Commission Staff member Mr. Dick O'Neil and the panelists participating in the June 8 Technical Conference demonstrates this flaw. Mr. O'Neil continually inquired of those supporting such long contract length terms as to how demand resources would be able to satisfy capacity obligations when such resource providers often do not know so far in advance what their capability to satisfy capacity obligation will be several years out. Tr. at 284 - 96.. Demand resource providers in PJM have stated that they cannot participate in RPM four years ahead of the delivery year, never mind 8 or 10 years ahead in a long-term opt-out option.[7] The adoption of such a long-term contract length requirement for the opt-out option will effectively inhibit the development of robust demand resource participation in PJM's capacity and bilateral contract markets.

[7] CCR has demonstrated this concern in its Protest submitted on October 19, 2005 in these dockets, as well as in its Post-Technical Conference Comments submitted on February 23, 2006 and its Request for Rehearing submitted on May 22, 2006 in these dockets.

4. An Appropriate Capacity Market Design Would Not Need an Opt-Out Option.

CCR submits these comments to ensure that any opt-out option fashioned by the Commission provides a viable and meaningful alternative to RPM. Notwithstanding these comments, CCR recommends that it would be more beneficial to all market participants to properly design a capacity market in a way that does not encourage LSEs to seek self-supply options. The onerous and costly nature of RPM seeks to lock in payments from consumers for excessive capacity well above the level determined as prudent by IRM assessments. RPM's market design encourages LSEs to opt-out in order to seek out alternative means of managing their supply and load obligations at a reasonable cost. The more efficient and less costly approach would be to design a capacity market from which LSEs will not seek opt-out options. CCR's proposed Enhanced Integrated Capacity Construct provides one such alternative that should be explored at hearing in this proceeding.

III. CONCLUSION

CCR continues its request that the Commission reconsider and abandon its decision to approve the core concepts of RPM as proposed by PJM. However, if the Commission decides to deny requests for rehearing of the Order and instead approve RPM as proposed, then CCR urges the Commission to consider the comments made by Mr. Wallach and Dr. Hausman at the technical conference, as well as herein, and (1) at least adopt the recommendations put forth by CCR to mitigate the unreasonable results of RPM in the first ten years through changes to several of the RPM demand curve parameters; and (2) direct PJM to adopt an opt-out mechanism that is widely available to

all LSEs with owned or contracted-for capacity and does not inhibit participation by demand response resources.

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PJM Interconnection, L.L.C.) **Dockets Nos. ER05-1410-000 & EL05-148-000**

POST-TECHNICAL CONFERENCE COMMENTS OF EZRA D. HAUSMAN, PH.D. ON BEHALF OF THE PENNSYLVANIA OFFICE OF CONSUMER ADVOCATE

DRAFT: June 19, 2006

My name is Ezra D. Hausman, Ph.D. I am a Senior Associate at Synapse Energy Economics ("Synapse"). I described my professional affiliation and experience in my pre-conference comments dated May 30, 2006 under these dockets. I would like to take this opportunity to offer post-conference comments as described under the "Supplemental Notice of Staff Technical Conference" dated May 17, 2006.

I offer these comments on behalf of the Pennsylvania Office of Consumer Advocate, one of the members of the Coalition of Consumers for Reliability ("CCR"), which is a party to these dockets. The CCR is comprised of state consumer advocates, electric cooperatives and municipal electric utilities representing consumers in 10 of the 14 states in which PJM operates.

At the technical conference, I stated that the model developed and applied by Professor Benjamin Hobbs for analyzing and comparing alternative Variable Resource Requirement (VRR) curves was a poor representation of market conditions in PJM, and that it therefore could not be relied upon as the basis for setting curve parameters under RPM. I detailed several of my concerns in a handout (attached) that I made available at the technical conference, entitled "PJM's VRR Curve Analysis: Model vs. Reality", and I discussed many of these concerns at the technical conference. Based on questions I received at the conference and on my own further analysis, I would like to expand upon some of these concerns.

Structural vs. Financial Obstacles

One concern that was discussed at length at the conference was that the PJM model considers only financial incentives and obstacles to investment. I noted that in many cases, structural obstacles such as availability and accessibility of sites, or access to transmission and fuel lines can be at least as important. In some cases, these obstacles can be so daunting that it may be impossible for independent entities to build in certain LDAs regardless of capacity payments. In other cases, entities that control viable sites, in particular those that are easily interconnected, may have a much stronger incentive *not* to build than to build under RPM, because a high capacity price will so richly reward their existing capacity. I pointed out that neither of these important considerations had any representation in the model.

Staff member Tatyana Kramskaya pointed out Dr. Hobbs' sensitivity case #5 on page 50 of his affidavit accompanying PJM's February RPM filing, and asked if I felt this addressed the possibility that generation investment may not be as facile as implied in the base case. I promised to address this question in my post-conference comments.

In fact, sensitivity case #5 only begins to address this question. In this case, identified as "Low percent CT added when profit is equal to cost", Dr. Hobbs assumed that a maximum of 5% of installed capacity could be added in any year if it was economically justified, as opposed to 7% in the base case. He found that this had a modest impact on the results. However, 5% is still an enormous annual addition to installed capacity, equal to about 8,000 MW at the current PJM capacity level. Achieving this 5% level may be difficult in a market with significant structural barriers to entry, and certainly in LDAs where, as experience has shown, building anything at all can be quite difficult. To represent these plausible cases, I modified sensitivity case #5 and, using Hobbs' model, tested much lower maximum capacity additions of 3%, 2% and 1% annually. These results are shown in Table 1.

Table 1. Sensitivity cases varying the maximum incremental capacity that can be added each year in Hobbs' model.

		Reserve Indices			Components of Generation Revenue			Consumer Payments for Scarcity + ICAP $/Peak kW-yr
Scenario	Maximum annual capacity addition (%)	% Years Meet or Exceed IRM	Average % Reserve over IRM	Generation Profit, $/Installed kW-yr	Scarcity Revenue $/Installed kW-yr	E&AS Fixed Revenue $/Installed kW-yr	ICAP Pay-ment $/Installed kW-yr	
Base Case ("Curve 4")	7%	98	1.79	12 ± 46	21 ± 44	10	42 ± 7	71 ± 48
Case 5	5%	98	1.77	13 ± 45	22 ± 44	10	42 ± 7	72 ± 48
Case 5a	3%	85	1.08	16 ± 52	26 ± 50	10	41 ± 7	76 ± 54
Case 5b	2%	43	-0.34	35 ± 79	41 ± 74	10	45 ± 18	96 ± 83
Case 5c	1%	1	-19.09	390 ± 117	327 ± 111	10	113 ± 11	457 ± 119

These results show that our concerns are accurate and justified. As it becomes more difficult to add generating capacity to the system (moving down through the rows of the table), reliability declines precipitously and costs to consumers skyrocket, accompanied by a generous increase in generator revenues. The decrease in reliability is shown in the columns labeled "Reserve Indices", which show that at annual construction rates below 5%, the percent of years at or above IRM decreases, while the average surplus capacity above IRM first decreases and then becomes a deficit. At the same time, generator profits and costs to consumers increase, driven mainly by scarcity revenues. (While I do not believe that scarcity revenues are calculated correctly in the model, as described below, I agree that the general correspondence of higher scarcity costs with lower reserves is reasonable.) As a result, generation owners have every incentive to keep capacity margins low in order to maximize revenues. At least in some LDAs, they will not find it difficult to do so.

I note that my most extreme sensitivity case (denoted 5c), at 1% maximum annual generation addition, is unrealistic in the long term because it is below the average rate of demand growth in the model (1.7% per year). However, it is still a useful illustrative example because capacity additions are never smooth in the real world, and there will inevitably be periods when capacity additions lag demand growth. In fact, there may well be areas of PJM in which capacity additions simply cannot keep pace with demand growth due to structural obstacles to investment, and where only transmission or demand-side solutions to reliability issues are feasible. Unfortunately, these options are ignored in Dr. Hobbs' model.

Thus, my answer to Ms. Kramskaya's question is, yes, Dr. Hobbs' limited analysis of the impact of reduced annual capacity additions does begin to address my concern in this particular area. However, Dr. Hobbs' implementation of this sensitivity case was far too timid. When a more realistic "low investment" case is tested, it suggests that RPM could lead to the compromised reliability and exorbitant costs that have been one of our key concerns throughout the RPM Stakeholder process.

Distortion in Calculating Energy Revenues

The calculation of energy revenues in Dr. Hobbs' model is counterintuitive and difficult to audit because it is based upon a simplified representation of an external model, which calculates the loss of load probability (LOLP) as a function of the reserve margin This external model has not been made available for review. To my understanding, as reserves decline in the model the LOLP increases, and this is interpreted as a greater frequency of the price hitting the cap of $1,000 per MW. *All* energy revenues in the model are based on "scarcity revenues" during these hours, which can occur in up to 5% of the hours in any model year.

For example, suppose Dr. Hobbs' formulation is applied to the calculated reserve margin for year *t* and predicts a probability of hitting the price cap of 1%. This is multiplied by the number of hours in a year (8760) and by the "scarcity" revenues a unit would earn in those hours. The hourly scarcity revenue per MW capacity is the difference between the energy price cap ($1000 per MWh) and the assumed marginal cost of a peaker ($79 per MWh in the model.) The result is then multiplied by 93% to account for unit availability. Thus, the energy revenues (*ER*) in year *t* would be calculated as:

$$ER(t) = .01 \times 8760 \times (1000 - 79) \times 0.93 = \$75{,}032 \;\big/\; MW * yr$$

Because in the model (as implemented for PJM) all capacity is peakers, this would translate into an "excess" consumer scarcity cost of about $6 billion for the year, given a model system capacity of 80,000 MW. This is presumably in addition to the "normal" (non-scarcity) energy costs of $79/MW-hr for all energy served, although these costs are not represented in the model.

Ancillary service revenues are assumed to always equal $10,000 per MW-yr in the model, which would add another $800 million to annual generator revenues but which, for some reason, is not included in the calculation of costs to consumers.

Leaving aside the question of whether or not this is a reasonable way to calculate revenues, or whether the underlying (but unavailable to us) LOLP model is reasonable,

the calculation itself contains a serious mathematical error. I obtained the heretofore unavailable data that Dr. Hobbs used to calibrate the loss of load probability function less than one week prior to the technical conference. I found (as outlined in the attached "Model vs. Reliability" handout) that Dr. Hobbs fit a simplified loss of load probability function over a range of reserve margin values between 0.589% and 27.692%, finding what he has repeatedly described as an "excellent fit" to the external, unavailable model. This function is quite unusual and relies upon five parameters, but in essence it is an "exponential" function which climbs quite rapidly at reserve margins (relative to IRM) close to or below zero. As shown in my handout, Dr. Hobbs did not use this crucial range of the function, near zero, in fitting his simplified formulation[8]. He then applies the simplified form well into this region, to a reserve margin as low as -2.5% in the model. (Below this value, according to Hobbs' model, the LOLP reaches the (arbitrary) maximum value of 5% so the calibration no longer has any impact.) What this implies is that Dr. Hobbs "excellent fit" is unlikely to apply over an important reserve margin range, and the energy revenues he calculates in this range have no analytical basis whatsoever.

How significant is this problem? Out of all of the 2,500 years simulated by Dr. Hobbs for the base case, 5.7% of the hours fell in the range where his fit has no validity. However, because revenues are so much higher in this range, 46.5% of the energy revenues calculated in the "base case" model—almost half—were attributable to these hours. The other half of the revenues are based on a more reasonable fit, but to a model which has not been made available for review, so I have no way of investigating whether they make sense or not.

[8] Hobbs' error is in extrapolating an exponential function to a region where its slope changes rapidly, resulting in alarmingly high revenues when the reserve margin is small. Referring to the figures in my "Model vs. Reality" handout (attached), the data in the chart on the right, solid line, are exactly the same as the data on the left, shown on a larger scale. The dashed line on the right shows what happens to the probability of hitting the cap below the calibration range used by Dr. Hobbs. We have no idea how his underlying model would behave in this region; perhaps it would not solve at all. This error casts serious doubt on the validity of the model as a whole.

According to Dr. Hobbs himself, "The E/AS gross margin that a turbine would earn in each year is critical to its profitability, and therefore to investors' willingness to build capacity." (February Affidavit, page 24 at 7) It is a grievous concern that such a critical element of the model should be built upon such a mathematically flawed foundation, with half of the revenues based on an artifact of miscalibration and the underlying model being beyond the purview of consumers. It is not justifiable, in formulating a public policy that will result in transfers of billions of dollars per year, to ignore such a significant error.

Cost of failure

The proponents of PJM's proposed VRR curve have great faith that it will produce capacity investments as projected by the Hobbs model. I share with other consumer advocates the concern that it will not. Before approving such a market instrument, FERC should consider the implications for consumers if PJM's assumptions turn out to be in error. PJM's Vice President of Market Services, Mr. Andrew Ott, noted at the technical conference that there is no mechanism for refunding consumers' money if RPM should lead to high costs and poor reliability, though such an outcome would provide a windfall to owners of generation resources. Mr. Ott did note that there would be an opportunity to adjust the curve in three years if it were not functioning as hoped. However, based on the tenor of the discussion, it seems that such that a failure might be taken as a sign that capacity prices were not high enough, leading to even higher prices and further punishment of consumers for the failure of generation to build adequate capacity. PJM has been frustratingly deaf to the concerns of these same consumers, that the underlying structure may be deeply flawed.

PJM has great confidence that higher capacity prices will lead to lower overall costs and better reliability for consumers. Owners of generation resources appear to support this notion but stand only to gain if it is not the case. Consumer advocates have seen enough examples of the punishing results when market design assumptions turn out to be in error, such as the assumptions underlying the California electricity market that lead to 100% reliance on spot purchases of power. To learn this lesson is to protect consumers from the overconfidence of market operators in their oversimplified models of

market behavior. The Commission should ensure that PJM's new capacity market construct contains such protections. The Commission should also insist that the analysis is complete so that the proposed VRR mechanism is not based on extensive assumptions about critical but unjustified performance characteristics of the proposed model.

RPM vs. RFP

Another issue that was raised in the technical conference was the difference between RPM and the Request for Proposals (RFP) process for acquiring needed capacity. I would like to reiterate here the important distinction between these two processes.

Under an RFP, the market operator identifies a need (in this case, for needed capacity in some location) and presents an opportunity for market participants to propose a least-cost solution to this need. This is a competitive process under which consumers get the benefit of competition in meeting reliability standards at least cost. Whoever is awarded the contract is required to build the needed capacity and is paid specifically for this service, under the terms of the contract. Other market participants, who were not awarded the contract, are not paid.

Under the RPM proposal, the capacity price is set administratively to equal what a non-market process identifies as the likely subsidy that a peaker would require in order to locate where it is needed, on average. The price may be higher or lower in any given year. This requirement is referred to by some as the "missing money", and it is a proxy for the subsidy that might be awarded through an RFP. However, under RPM, *all* capacity would be given this subsidy; this multiplies the cost to consumers by a factor of perhaps between 10 and 100. In addition, under RPM there is no requirement for building any actual capacity in order to receive this subsidy—in fact, the less that gets build, the higher the subsidy will be.

Because of these differences, CCR believes that RPM presents a perverse incentive system that could lead not to benefits for consumers, but to compromised reliability and higher costs. The enthusiastic reception generating companies have given this proposal may suggest that their expectations are the same as CCR's.

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PJM's VRR Curve Analysis: Model vs. Reality

The model used by PJM's expert to evaluate various VRR curves, and to justify the RPM model itself, is only useful to the extent that it reflects the market conditions and incentives faced by potential investors in new capacity in PJM. The Coalition of Consumers for Reliability (CCR) concludes that it reflects these realities poorly. Here is a summary of some of our concerns with this model; these and other concerns must be fully addressed before this model serves as the basis for PJM's locational capacity market:

1. The model addresses only cash flow aspects of generation investment decisions, ignoring significant non-financial obstacles such as transmission access, available sites, fuel lines, and capital

In reality it is structural concerns, at least as much as forecasted cash flows, will determine where and when needed generation is built.

2. The model evaluates each potential capacity investment without consideration of any other assets the investor may own in the market, as if potential investors were never market participants

In reality, generation owners will seek to maximize the value of their portfolio of assets, including existing base load generation, and would often stand to benefit more from shortage than from capacity investments.

3. The model addresses only PJM as a whole, not LDAs, and thus can rely only on generation solutions

In reality, transmission solutions are often the most economical approach to resolving local reliability concerns, at a fraction of the cost of the capacity payments under this model.

4. The underlying mathematics of the model are inconsistent with the description in the affidavit of Professor Benjamin Hobbs, and are not a realistic representation of market economics. In particular, the calculation of energy revenues for a hypothetical peaker is based solely on hours when the price hits the price cap as predicted according to a simplified formula embedded in the model

In reality, prices in PJM exceeded the model's "peaker cost" of $79 about 25% of the time in 2005, but just about never reached the price cap.

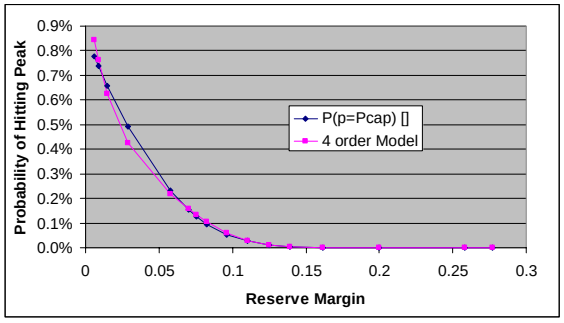
5. In the model, the probability of hitting the price cap is a smooth, exponential function of the reserve margin, with the specifics of the function derived from another model which has not been made available for review. This function is used both for calculations within the model (determining new entry) and for calculating results (energy revenues, costs to consumers)

In reality, energy revenues are a complex function of load shape, fuel prices, demand response, transmission availability, and many other variables that are not represented in the model.

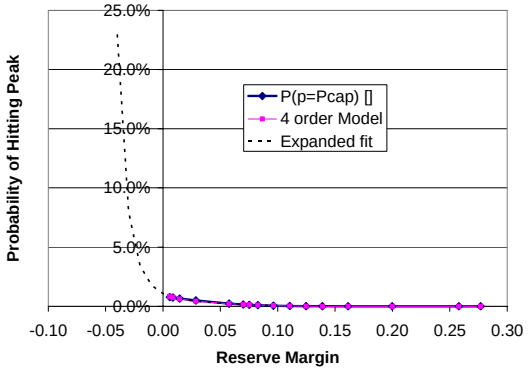
6. In the model, an exponential/polynomial function is used to calculate the energy revenues, and this function is supposed to replicate the output of another probabilistic LOLP model.

In reality, the exponential function is an extremely poor proxy for the source model over important parts of the range of reserve margins in the model.

Calibration range:



Reserve margin range in model:



7. The model supports the conclusion that curve four, the VRR curve proposed for use by PJM, has the lowest generator margins and the lowest customer payments, both lower by far than the current system.

In reality, generators have overwhelmingly endorsed this curve while consumer advocates and load have overwhelmingly opposed it. This is difficult to reconcile with the interests of these stakeholder groups!

PJM stakeholders have had a very limited opportunity to review, audit, verify or validate this model, the underlying data, or the underlying probabilistic model on which the revenue calculations are based. What we see so far does not give us confidence that it is a reasonable or accurate representation of the factors which govern capacity additions, generator revenues or consumer payments. Unless and until these concerns are adequately resolved, this model should not be relied upon in support of PJM's capacity market design.

For more information on this analysis, please contact Ezra Hausman at Synapse Energy Economics, at ehausman@synapse-energy.com.

CERTIFICATE OF SERVICE

I hereby certify that I have served a copy of the foregoing to all parties on the official Service List in this proceeding, pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.2010.

_/S – *Adrienne E. Clair*/
Adrienne E. Clair