

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation)	
)	
v.	)	Docket No. EL16-49-000
)	
PJM Interconnection, L.L.C.)	
)	
PJM Interconnection, L.L.C.	)	Docket No. ER18-1314-000
	)	Docket No. ER18-1314-001
PJM Interconnection, L.L.C.	)	Docket No. EL18-178-000
)	
		(Consolidated)

INITIAL BRIEF OF THE PJM POWER PROVIDERS GROUP

Pursuant to the June 29, 2018 Order of the Federal Energy Regulatory Commission (“FERC” or “Commission”) in the above-captioned proceedings and the Commission’s extension of time,¹ the PJM Power Providers Group (“P3”)² respectfully submits the following comments in the above-captioned proceeding. For the reasons described herein, P3 urges the

¹ See *Calpine Corp. v. PJM Interconnection, L.L.C.*, 163 FERC ¶ 61,236 at Ordering Para. (F) (2018) (the “June 29 Order”), *reh’g pending*; *Calpine Corp. v. PJM Interconnection, L.L.C.*, Notice of Extension of Time, Docket Nos. EL16-49-000, *et al.* (August 22, 2018) (unreported).

² P3 is a non-profit organization dedicated to advancing federal, state and regional policies that promote properly signed and well-functioning electricity markets in the PJM Interconnection, L.L.C. (“PJM”) region. Combined, P3 members own over 84,000 MWs of generation assets, produce enough power to supply over 20 million homes and employ over 40,000 people in the PJM region covering 13 states and the District of Columbia. For more information on P3, visit www.p3powergroup.com. The comments contained in this filing represent the position of P3 as an organization, but not necessarily the views of any particular member with respect to any issue.

Commission to adopt a Minimum Offer Pricing Rule ("MOPR")³ applicable to all materially subsidized resources without categorical exemptions ("Clean MOPR") while preserving the ability of states to procure their own capacity resources through PJM's existing Fixed Resources Requirement ("FRR") mechanism.

I. BACKGROUND

On June 29, 2018, the Commission instituted a paper proceeding in this docket, pursuant to section 206 of the Federal Power Act ("FPA"),⁴ to determine the just and reasonable replacement rate for PJM's Tariff, based on its finding in Docket Nos. EL16-49 and ER18-1314 that PJM's currently effective Tariff is unjust, unreasonable, and unduly discriminatory or preferential. *Calpine Corporation v. PJM Interconnection, L.L.C.*, 163 FERC ¶ 61,236 (2018) ("June 29 Order").⁵ The June 29 Order addressed two proceedings initiated in response to increasing state-sponsored out-of-market support for generation resources in the PJM competitive wholesale capacity market. The first was the Calpine Complaint against PJM pursuant to section 206⁶ of the FPA, filed by Calpine Corporation, and joined by additional generation entities, in Docket No. EL16-49-000. The second was PJM's proposed revisions to its Tariff, pursuant to section 205⁷ of the FPA, in Docket Nos. ER18-1314-000, *et al.*, that offered two alternate proposals designed to address the price suppressing effects of state out-of-market

³ This and other capitalized terms not otherwise defined herein have the meanings given them in the PJM Interconnection, L.L.C. ("PJM") Open Access Transmission Tariff ("Tariff").

⁴ 16 U.S.C. §824e (2012).

⁵ P3 was a party to the underlining proceedings in Docket No. EL16-49-000, and ER18-1314-000. Parties in those proceedings were "invited to submit an initial round of testimony, evidence, and/or argument" for the Paper Hearing initiated through this proceeding. June 29 Order, Ordering Paragraph (F). However, on August 27, 2018, P3 also filed a doc-less Motion to Intervene Out-of-Time in EL18-178-000.

⁶ 16 U.S.C. § 824e (2012).

⁷ 16 U.S.C. § 824d (2012).

support for certain resources, "Capacity Repricing," and a "MOPR-Ex."⁸ In its June 29 Order, the Commission stated that "it has become necessary to address the price suppressive impact of resources receiving out-of-market support. Because the current MOPR applies only to new natural gas-fired resources, it fails to mitigate price distortions caused by out-of-market support granted to other types of new entrants or to existing capacity resources of any type."⁹

The June 29 Order found that PJM's existing MOPR renders the PJM Tariff unjust and unreasonable. However, the Commission was unable, based on the existing record in the two proceedings, to make a final determination regarding the just and reasonable replacement rate for the PJM Tariff.¹⁰ The June 29 Order, therefore, consolidated the two proceedings, initiated a paper hearing in Docket No. EL18-178-000, and invited parties to submit additional arguments and evidence to address on certain proposed Tariff amendments that could render PJM's Tariff just and reasonable.

Initially, the Commission found that its proposed replacement rate may produce a just and reasonable result. First, the Commission found that PJM "should expand the MOPR for those resources seeking to participate in the capacity auction."¹¹ The Commission stated that "**[A]n expanded MOPR, with few or no exceptions,** should protect PJM's capacity market from the price suppressive effects of resources receiving out-of-market support by ensuring that such resources are not able to offer below a competitive price."¹²

⁸ June 29 Order, P 3; 4.

⁹ *Id.*, at P 5.

¹⁰ June 29 Order, P 157.

¹¹ *Id.*

¹² June 29 Order, P 158 (emphasis added).

The Commission further found that "[I]n addition to expanding PJM's MOPR, we also preliminarily find that it may be just and reasonable to accommodate resources that receive out-of-market support, and mitigate or avoid the potential for double payment and over procurement, by implementing a resource-specific FRR [Fixed Resource Requirement] Alternative option . . . to allow, on a resource-specific basis, resources receiving out-of-market support to choose to be removed from the PJM capacity market, along with a commensurate amount of load, for some period of time."¹³ The Commission noted that "the resource-specific FRR Alternative would accommodate policies to provide out-of-market support to certain resources, but remove those resources from the market. This would essentially create a bifurcated capacity construct – resources receiving out-of-market support and a commensurate amount of load would be outside of the PJM capacity market, thereby increasing the integrity of the PJM capacity market for competitive resources and load."¹⁴

In addition to the suggested bifurcated capacity construct, the Commission requested that parties comment on several additional capacity market issues, including the appropriate scope of out-of-market support to be mitigated by the expanded MOPR, thereby rendering a resource eligible for the new resource-specific FRR Alternative.¹⁵

II. COMMENTS

PJM's capacity markets are at a critical inflection point and the Commission's decision in this proceeding will likely determine whether the future of resource adequacy in PJM will be

¹³ *Id.*, P 160.

¹⁴ *Id.*, P 161.

¹⁵ June 29 Order, P 165.

based on a competitive structure in which reliability is met through specific performance criteria at the least cost, or via a costly balkanized patchwork of subsidized and non-subsidized resources somehow gelling in a manner that assures a sufficient supply of generation. In other words, this proceeding will likely determine whether PJM is going to remain a beacon of hope for competitive markets or become similar to other states and regions in which reliability concerns are manifest, needed resources do not have sufficient revenues, and out-of-market actions are the new normal.

The Commission should not be distracted by red-herring arguments offered by subsidy supporters. P3 does not deny that a state has a right to pursue its desired energy policies. That said, as an organization, P3 has argued passionately against certain state policies that interfere with the proper functioning of wholesale markets and has always suggested a market-based solution to any policy goal as a preferable approach. Further, P3 also believes that state actions and their consequences should be transparent, with the state and its citizens consciously understanding the cost implications of their actions, as opposed to transferring those consequences to competitive suppliers who have relied on the Commission's historic support of markets.

It is undeniable that states that voluntarily chose to enter regional competitive wholesale markets decades ago have made subsequent decisions that undermine those very markets. Those decisions belong to the state and the state must be prepared to accept the consequences of those decisions, lest the entire region suffer. These states should not be allowed to impose their decisions (ill advised or not) on the remainder of market participants and other states' own plans and initiatives that may more appropriately intend to utilize a true competitive platform. This proceeding is not about, nor should it be about, the decisions made in the states. This proceeding

is entirely about the wholesale market rate for capacity in the PJM region and the steps necessary to render that rate just and reasonable.

As is becoming abundantly clear, from a string of court decisions following *Hughes*,¹⁶ if the problem of subsidized resources rendering PJM's market unjust and unreasonable is to be fixed, the buck stops at FERC. FERC will have to fix the problem of out-of-market subsidies rendering PJM's wholesale capacity rates unjust and unreasonable.¹⁷

P3 applauds the Commission for taking a strong stand in defense of the integrity of the capacity market in the face of a wave of out-of-market interventions at the state level. In the June 29 Order, FERC said clearly what PJM understood but was unwilling to say – PJM's rates are unjust and unreasonable because of the price suppression caused by out-of-market subsidies to politically chosen resources. This was the correct conclusion and the Commission leadership is noted and appreciated.

However, the replacement rate suggested by the Commission – specifically the unit specific FRR – cannot be structured in such a way to solve the problem that the Commission so articulately presented. In fact, the unit specific FRR exacerbates the problem and provides an easy path forward for additional subsidization and the resultant price suppression. As explained in further detail below and in the attached Affidavit from Dr. Roy Shanker, it is simply not possible to make the unit specific FRR work in a manner that addresses the problem of price suppression.

P3 continues to maintain that the best means to achieve just and reasonable wholesale market rates in PJM is through a combination of a Clean MOPR with few or no exceptions, as

¹⁶ *Hughes v. Talen Energy Marketing, LLC*, 136 S. Ct. 1288 (2016).

¹⁷ *EPSA v. Starr*, ___ F.3d ___ (7th Cir., 2018) (No. 17-2433).

the Commission agreed, and the existing PJM Fixed Resource Requirement, which provides a viable means for a state to exit the regional capacity market should it so choose. P3 explains further below.

A. The Proposed Unit Specific FRR will not result in just and reasonable wholesale rates.

A unit specific Fixed Resource Requirement, as proposed by the Commission, raises significant price suppression concerns. As detailed in the attached Affidavit from Dr. Roy Shanker, the removal of a generation facility and the load associated with that facility would have the same effect as a subsidized unit bidding in as a price-taker under the existing capacity construct. The consequential impact on the market is the same price suppression that rendered PJM's existing tariff unjust and unreasonable. Similarly, as Dr. Shanker notes, PJM's and the PJM IMM's interpretations of the Commission's suggestion reach the exact same conclusion.

In PJM's current market structure, with a very narrow and largely ineffective MOPR, subsidies provide a path for uneconomic units to clear the capacity auction. In doing so, subsidized units take the place of other non-subsidized units that would otherwise be economic. A unit receiving a subsidy is liberated from the need to recover its costs as a rational market participant and is instead able to bid at a level well below its costs (or zero) because it is propped up by an out-of-market subsidy. From a PJM perspective, the subsidized entity bids below its costs or at zero and the market clears at a lower point on the supply curve as a result of the subsidy.

In regard to the unit specific FRR in which load is removed from the market in a corresponding amount to the FRR resource's capacity, the impact on the market is the same as if the load stayed in the auction and the FRR generator bid in at zero. As Dr. Shanker explains, "

“When an existing unit that failed to clear the RPM auction receives a subsidy and then clears, under a partial FRR load would be reduced comparable to the size of the subsidized unit (including reserve adjustment). However, the same supply curve that would have existed without the subsidized unit remains up to the previous higher load requirement. This unequivocally results in the same previous existing supply competing for less load, and a lower clearing price due to the subsidy.”¹⁸ In other words, the clearing price is the same when the subsidized unit bids at zero as when the subsidized unit is removed from the auction via a unit specific FRR. The very result that the Commission seeks to avoid (price suppression from subsidization) remains and PJM’s wholesale capacity rates continue to be unjust and unreasonable.

Dr. Shanker points out that PJM’s modelling arrives at the same conclusion that “there is no distinction between the partial/unit specific FRR notion of removing both subsidized generation and comparable load versus simply the full inclusion of unmitigated, subsidized supply bidding in at zero. In both cases the result is the same, and the level of price suppression is identical.”¹⁹ Despite the earnest efforts of PJM and its stakeholders to develop a unit specific FRR that could lead to just and reasonable wholesale capacity market rates, Dr. Shanker concludes, “The inevitable, and perhaps at some level regrettable, conclusion that I reach is that a unit specific FRR just doesn’t work. From the view of other market participants, load will be decreasing for the same level of supply whether the exempted unit is a new entrant or an uncompetitive existing supplier. This makes the price suppression worse, not better.”²⁰

¹⁸ Shanker at P 21.

¹⁹ Shanker at P 28.

²⁰ Shanker at P 39.

B. The Commission Should Adopt a "Clean MOPR" That Ensures That No Exemptions Will Be Provided To Out-of-Market Subsidies In The PJM Wholesale Capacity Market.

As the Commission found in its June 29 Order, out-of-market subsidies in the PJM capacity market are both substantial in number and detrimental to the integrity of the wholesale competitive markets. In part, the Commission stated that:

Over the last few years, the integrity and effectiveness of the capacity market administered by PJM Interconnection, L.L.C. (PJM) have become untenably threatened by out-of-market payments provided or required by certain states for the purpose of supporting the entry or continued operation of preferred generation resources that may not otherwise be able to succeed in a competitive wholesale capacity market. The amount and type of generation resources receiving such out-of-market support has increased substantially. What started as limited support primarily for relatively small renewable resources has evolved into support for thousands of megawatts (MWs) of resources ranging from small solar and wind facilities to large nuclear plants. . .

These subsidies enable subsidized resources to have a suppressive effect on the price of capacity procured by PJM through its capacity market, called the Reliability Pricing Model (RPM). Out-of-market payments, whether made or directed by a state, allow the supported resources to reduce the price of their offers into capacity auctions below the price at which they otherwise would offer absent the payments, causing lower auction clearing prices. . . With each such subsidy, the market becomes less grounded in fundamental principles of supply and demand.²¹

The June 29 Order describes, at length, what P3 and other interested parties have been informing the Commission over the last few years: that "changed circumstances" in the PJM market have shown that PJM's current MOPR, restricted only to new natural gas-fired resources, is no longer just and reasonable. As the Commission noted, the "thousands" of megawatts receiving out-of-market subsidies consists of both new, renewable resources as well as "older, uneconomic resources in PJM, which may not be able to clear the market based on their costs

²¹ June 29 Order, P 1; 2.

alone, [and] are increasingly receiving out-of-market support to allow them to remain in the market."²² The Commission found that these out-of-market subsidies "cause unjust and unreasonable and unduly discriminatory rates in PJM regardless of the intent motivating the support."²³ Thus, the Commission concluded that:

We are compelled by the evidence presented by PJM, Calpine, and other parties to these proceedings to conclude that out-of-market payments by certain PJM states have reached a level sufficient to significantly impact the capacity market clearing prices and the integrity of the resulting price signals on which investors and consumers rely to guide the orderly entry and exit of capacity resources. We cannot rely on such a construct to harness competitive market forces and produce just and reasonable rates. The PJM Tariff, therefore, is unjust and unreasonable.²⁴

The Commission's conclusions that PJM's current Tariff is unjust and unreasonable, and that an "expanded MOPR" should be adopted, cannot be disputed. Expert testimony, such as that offered by P3 of Dr. Shanker²⁵ as well as the extensive arguments and supporting testimony from PJM itself, clearly provided the Commission with the needed evidence of not only the thousands of megawatts that currently receive out-of-market subsidies, but also experts' opinion that the trend indicates that these subsidies will substantially increase. Thus, it is not apparent why the Commission is inquiring into the "appropriate scope" of an expanded MOPR.

P3 continues to assert that the only type of MOPR that will ensure the necessary integrity of the competitive wholesale market is a MOPR completely free of any exemptions: state- or federally-imposed, i.e., a "Clean MOPR." P3 submits that even a moderate amount of subsidies

²² *Id.*, P 154.

²³ *Id.*, P 156.

²⁴ *Id.*

²⁵ See Affidavit of Dr. Roy Shanker, Ph.D., attached to the Protest of the PJM Power Providers Group, Docket No. ER18-1314-000; ER18-1314-001, dated May 7, 2018.

is harmful to a competitive market. As PJM has noted, an out-of-market subsidy of any kind has numerous, harmful effects to the capacity market, including the fact that it:

- undermines robust competition because other sellers cannot compete against a substantial subsidy available only to select capacity sellers;
- distorts price signals needed to guide orderly entry and exit because the clearing price does not reflect the costs of the committed resources that, in reliance on the subsidy, offered well below their net costs of committing as capacity;
- does not result in selecting least-cost resources that possess the attributes sought by the market, because those resources may be priced out by subsidized resources that are selected despite their higher costs;
- undermines price transparency because the actual cost of providing capacity is not being transparently communicated since it is masked by the subsidy;
- shifts risk from private capital to customers, because resource owners are insulated from the financial consequences of a resource that cannot, based on its economics, clear in a competitive auction, with customers (and other wholesale market participants . . .) bearing the costs of keeping the resource in operation; and
- does not recognize or address any market power that may be involved in the submission of a below-cost offer.²⁶

Due to the fact that even a small amount of subsidies is harmful to a competitive market, PJM has found that "a part subsidized/part competitive market cannot carry out the critical function of ensuring reliability."²⁷ Therefore, instead of attempting to draw the line at just how much subsidies the market will tolerate, the Commission would provide greater protection for all market participants if it acknowledged that *any* subsidies are harmful to the market, and thus

²⁶ PJM Interconnection, L.L.C., Capacity Repricing or in the Alternative MOPR-Ex Proposal: PJM Tariff Revisions to Address Impacts of State Public Policies on the PJM Capacity Market, Docket No. ER18-1314-000, filed April 9, 2018 ("PJM Capacity Reform Proposal"), p. 46, citing ISO New England, Inc., 162 FERC ¶ 61,205 (2018) ("CASPR Order"), at P 21, citations eliminated.

²⁷ *Id.*, p. 33.

mitigate subsidies of any kind. The burden that some partial level of subsidies do not impact the market rests entirely on those who seek exemptions from mitigation for the offer price floor of such subsidized supply. To date, the record is devoid of any such evidence.

Equally as important, if even a "few" subsidies, via a limited MOPR that allows selective exemptions, are unmitigated, more subsidies will be encouraged. This is an obvious and rational result. As PJM has found, "subsidies beget subsidies: basing markets on subsidies, rather than on costs, incents suppliers to seek subsidies of their own. Subsidy-based markets are inherently risky and unstable for the unsubsidized supply because each additional asset owner that seeks and obtains a subsidy disrupts the ability of more sellers to clear based on their actual costs and efficiencies. A part-subsidized/part-competitive market is thus a very poor design choice for the critical function of ensuring reliability."²⁸ Such a market design does not distinguish between what is the best solution for society as a whole based on true "visible" costs versus the variety of subjective incentives and subsidies based on the preferences of those seeking to obtain preferential treatment.

A Clean MOPR would not include any exception for self-supply, public power or vertically integrated utilities. As detailed in the attached affidavit by Dr. Roy Shanker, a blanket exemption for self-supply resources provides an inappropriate incentive to overbuild capacity and suppress capacity prices for remaining suppliers. As Dr. Shanker states, "The assurance of recovery (or ability to charge/pass through) prudent costs constitutes a material subsidy which

²⁸ *Id.*, p. 34, citing FERC Staff Report to the Secretary on Electricity Markets and Reliability, U.S. Department of Energy, at 14 n.q (Aug. 17, 2017) (noting that "subsidies beget subsidies"); see also State of the Market Report for PJM, Monitoring Analytics, LLC, 42 (Mar. 8, 2018). http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2017/2017-som-pjm-volume1.pdf ("Subsidies are contagious").

leads to price suppression. The market seller is assured full prudent cost recovery regardless of the market-clearing price and thus has an incentive to offer at zero, to assure clearing and some offset of regulatory revenues. In turn, the self-supply seller is allowed to lean on the rest of the market when convenient in order to reduce the costs of carrying surplus capacity at the expense of other load, while at the same time suppressing pricing to competitive suppliers.”²⁹

For all of these reasons, P3 urges the Commission to reject a “part-subsidized” PJM wholesale market and find that a “Clean MOPR” is the most appropriate mechanism to ensure integrity in the competitive wholesale market. P3 strongly believes that such a MOPR will provide the necessary foundation for ensuring a just and reasonable replacement rate and will increase the integrity of the PJM capacity market.

C. PJM’s Current FRR Mechanism, with Certain Modifications, Represents a Viable Means for States to Procure Capacity.

Participation in PJM’s regional wholesale capacity market is a choice, not a mandate. Under current PJM rules, every PJM state, via their Load Serving Entities, may exit the regional capacity market and assume responsibility for resource procurement through the existing FRR mechanism. For those states that elect to participate in the regional market comes a necessary and corresponding obligation to play by FERC’s rules for the interstate capacity markets. However, any state can always elect to procure capacity on its own and, provided capacity performance obligations are met, pick the resources the state wants to provide its capacity and choose the means by which to pay for those resources.³⁰

²⁹ Shanker at P 15.

³⁰ See, Schedule 8.1 of the Reliability Assurance Agreement (RAA).

No state has elected to pursue such a route, but several Load Serving Entities have availed themselves of the FRR option, and in doing so, assumed all responsibility for resource procurement in concert with their state regulatory authority. P3 respectfully submits that the FRR option is not widely used because of the incentives imbedded in the current rules which allow states to subsidize politically selected resources while suppressing prices for the unsubsidized fleet that is leaned upon for reliability. In effect, states have the luxury of having it both ways – they can choose their resources without regard to market economics while suppressing the price for the resources that are not favored, but still needed to maintain resource adequacy. It is no wonder that the proliferation of subsidies is seen as inevitable.³¹

Recent events in New Jersey underscore this very point. New Jersey Governor Phil Murphy has made it very clear that he would like New Jersey consumers to support the construction of 3500 MW wind off the coast of New Jersey.³² On Monday September 17, 2018, the New Jersey Board of Public Utilities (“NJ BPU”) announced an initial solicitation for 1100 MW’s of off-shore wind with additional solicitations in 2020 and 2022. As proposed, none of this capacity would face a true market test. As part of the review process, applicants will have to submit a proposed “OREC Purchase Price” to the NJ BPU which reflects the “total capital and operating cost” for the off-shore wind facility.³³ In other words, the OREC will provide the complete financial support for the project.³⁴ While New Jersey is certainly allowed to offer such

³¹Affidavit of Dr. Anthony Giacomoni, <https://pjm.com/directory/etariff/FercDockets/3576/20180409-er18-1314-000.pdf> Attachment F.

³² <https://www.nj.gov/governor/news/news/562018/approved/20180917b.shtml>

³³ <https://nj.gov/bpu/pdf/boardorders/2018/20180917/9-17-18-8G.pdf> at page 2

³⁴ It is worth noting that the NJ BPU will not be conducting a traditional cost-plus review of these proposed new off-shore wind generation facilities. Instead, like Maryland, the NJ BPU will be analyzing whether the cost of the OREC exceeds the benefits of the project (which include factors such as job creation and carbon avoidance). The

incentives, there is no basis for these decisions to influence the prices received by competitive suppliers over the entire PJM footprint. This is a New Jersey determination, and if the policymakers in this state want to take such an action, it should be done without prejudice to other market participants.

Further, the New Jersey Off Shore Wind program requires these developers to forecast the PJM energy, capacity and ancillary services revenues from the off-shore wind facility and then identify a strategy for “maximizing” these revenues.³⁵ New Jersey will then credit consumers for any PJM revenues that are generated. In essence, New Jersey consumers will pay the OREC and then get credited the PJM revenues rendering the market impact very similar to a contract for differences – with New Jersey consumers paying the difference between the market price and the above-market price for the politically chosen resources. Because these off-shore wind facilities will have their revenue guaranteed by the citizens of New Jersey and an obligation to maximize PJM revenues, they are almost certain to bid into the capacity market as price takers, even though their actual costs are substantially above market and suppress the capacity price of other, more competitive, resources. In other words, New Jersey gets to pick the resources it wants and suppress the price for the resources it needs.

New Jersey’s recent foray into the generation capacity business is nothing new. Three years after New Jersey vowed to fight in federal courts certain features of the capacity market in order to “reduce excessive capacity costs,”³⁶ it approved capacity payments for three new natural

Commission will not be evaluating the reasonableness of any specific costs associated with the generation or the appropriate return on that investment.

³⁵ <https://nj.gov/bpu/pdf/boardorders/2018/20180917/9-17-18-8G.pdf> at page 9 Subsection 3.6.

³⁶ “With capacity costs now accounting for about 15 to 20 percent of the price of electricity in New Jersey, strategies to reduce excessive capacity costs are an essential part of efforts to reduce electricity prices. For this reason, the

gas powerplants in New Jersey at prices dramatically above the market price for capacity. As just one example, the contract price for capacity approved in New Jersey for CPV Shore (one of three new natural gas plants to be chosen for a subsidy in 2011) in 2018 would have been \$303.45/MW (as compared to the market clearing price in EMAAC of \$120/MWd). If the New Jersey capacity contracts had not been judicially invalidated due to the unconstitutionality of the underlying Long-Term Capacity Agreement Pilot Program Act (LCAPP), New Jersey ratepayers would have paid \$48.5 million more this year than the market price for the 725 MWs of capacity associated with the facility.³⁷ In this case, New Jersey made the choice to pay nearly \$50 million more for 725 MW than the market price in 2018 for just this single year. The total capacity premium New Jersey ratepayers would have been obliged to pay to just this one plant from delivery year 2016 to delivery year 2021 is over \$231 million.³⁸ Based on the previous analyses of the PJM IMM, this would approach a price suppression impact of several billions of dollars for other suppliers.³⁹ If New Jersey would like to forsake the economic benefits of a fully integrated RTO market because of a desire to procure its resources based on what it wants rather than the integrated market, New Jersey can choose the existing FRR and go that route. It is not up to FERC to question New Jersey's political desire to overpay for capacity.

However, it *is* up to FERC to demand that if a state like New Jersey elects to remain in the wholesale market that it plays by FERC's rules. New Jersey's overpayment should only

BPU will continue to challenge RPM in the federal courts”³⁶ https://www.state.nj.us/emp/docs/pdf/081022_emp.pdf. 2008 New Jersey Energy Master Plan at 41.

³⁷ Letter from Ralph LaRossa, PSEG, President and Chief Operating Officer, to Kristi Izzo, Secretary to the New Jersey Board of Public Utilities, RE: Executed Standard Offer Capacity Agreement, April 26, 2011.

³⁸ It should be noted that the CPV Shore is fully operational and actively participating in the market without the subsidy payment.

³⁹ See Shanker Affidavit at P 25.

impact New Jersey - - not the rest of PJM. Again, the door is open for any state, such as New Jersey, that wants to go its own way. But for those who stay, playing in a regional wholesale market that does not tolerate price suppression because of the subsidization of politically selected resources, is a trade off that a state must be willing to make. The Commission will likely hear arguments from several states that the trade off is not a fair one or not one that they will like to make. P3 respectfully suggests that the Commission must end the current “cake and eat it too” paradigm that is significantly eroding the market. Under P3’s approach, states still very much control the decision to participate in the wholesale capacity market and are not powerless to acquire capacity resources should they so choose. However, the decision needs to be framed in such a way that whatever choice a state makes, the integrity of the remaining competitive regional capacity market will be preserved. The existing FRR mechanism, with certain modifications, combined with a Clean MOPR with no exceptions, is well-equipped to meet that mission.

The process for a state to use the existing FRR mechanism is straight forward.⁴⁰ Working through its LSEs, the state and the LSEs would develop, fund and approve a capacity procurement plan that meets PJM’s criteria. Under such an approach, the LSE would not pay any PJM capacity charges, nor would capacity resources in the LSE’s FRR plan receive any capacity revenues. LSEs would be required to have a certain amount of internal generation but could also acquire capacity outside of the LSE’s delivery area under certain circumstances. As mentioned before, several LSEs (in conjunction with their state regulatory authority) have

⁴⁰ See generally. <https://www.pjm.com/-/media/committees-groups/task-forces/ccppstf/20170817/20170817-fixed-resource-requirement-overview.ashx>

already availed themselves of this option.⁴¹ Under such a decision, as commented by Dr. Shanker, the LSE, forgoing the benefits of the PJM integrated regional adequacy market, would have to “go on its on” and satisfy its requirements without leaning on the rest of the RTO for reliability benefits and the ability to “dump” its excess supply at the expense of other RTO participants.⁴²

As noted by Dr. Roy Shanker in the attached Affidavit, there are two aspects of the existing FRR mechanism that need to be reevaluated.⁴³ Specifically, current FRR entities only need to procure capacity obligations up to the Installed Reserve Margin (“IRM”) which allows for a lien on the system when PJM procures above the IRM. This “free lien” needs to be eliminated. Likewise, FRR entities are allowed to sell excess capacity into the pool which creates an incentive to overbuild. Accordingly, P3 would ask the Commission to direct PJM, as part of a compliance filing in this proceeding, to correct these problems with the existing FRR mechanism.

III. CONCLUSION

P3 remains hopeful that a viable capacity market with just and reasonable wholesale rates can be established in PJM. As the Commission is well-aware, the problem of subsidized resources suppressing capacity prices for unsubsidized units will only be resolved when FERC takes affirmative action to do so. State policies can be accommodated, but they are best accommodated through the existing PJM FRR mechanism in which a state can assume full

⁴¹ See generally https://www.appalachianpower.com/global/utilities/lib/docs/account/service/choice/APCO_FERC.pdf

⁴² Shanker at P 42-43.

⁴³ Shanker at P 41-43.

responsibility for resource adequacy. For the states that choose to remain in an interstate capacity market and not elect a FRR option, a revised Clean MOPR provides those states confidence that the interstate market is producing just and reasonable wholesale market rates. The Commission should provide that confidence.

October 2, 2018

Respectfully submitted,

On behalf of the PJM Power Providers Group

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CERTIFICATE OF SERVICE

I hereby certify that in accordance with Rule 2010 of the Commission's Rules of Practice and Procedure, 18 C.F.R. § 385.2010 (2017), I have served a copy of the foregoing to all parties on the official service list in these proceedings.

Respectfully submitted,

On behalf of the PJM Power Providers Group

/s/ Laura Chappelle _____

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October 2, 2018

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation)	
)	
v.	)	Docket No. EL16-49-000
)	
PJM Interconnection, L.L.C.)	
)	
PJM Interconnection, L.L.C.	)	Docket No. ER18-1314-000
	)	Docket No. ER18-1314-001
PJM Interconnection, L.L.C.	)	Docket No. EL18-178-000
	)	(Consolidated)

Affidavit

of

Roy J. Shanker, Ph.D.

On Behalf of

The PJM Power Providers Group

Submitted October 2, 2018

Attachment
Affidavit of Roy J. Shanker, Ph.D.

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

AFFIDAVIT OF ROY J. SHANKER, Ph.D.

Docket No. EL16-49-000
Docket No. ER18-1314-000
Docket No. ER18-1314-001
Docket No. EL18-178-000

1. My name is Dr. Roy J. Shanker. My address is P.O. Box 1480, Pebble Beach, CA. 93953. I am an independent consultant. My resume, attached as Exhibit RJS-1, summarizes my experiences in numerous regulatory proceedings before state commissions and the Commission.

2. I have been asked by the PJM Power Providers Group (“P3”)¹ to review the Federal Energy Regulatory Commission’s (“Commission”) June 29, 2018 Order in Docket Numbers EL16-49-000; ER18-1314-000; ER18-1314-001; and EL18-178-000 (Consolidated). (“Order” or “June 29 Order”).

3. I am an independent consultant. I have worked on electricity issues since approximately 1973 and independently since approximately 1981. I have had consulting engagements related to PJM since approximately 1976. I have been part of the PJM ISO/RTO stakeholder process since approximately 1995. I have participated in just about every aspect of the PJM capacity market developments since the inception of the market. I was involved in the development of the RPM through stakeholder processes and related Commission dockets and participated in the Commission settlement proceedings that resulted in the initial version of RPM.

4. I have also submitted comments to the Commission regarding the above dockets and similar proceedings in other markets. Specifically, I have offered testimony on this

¹ While I have been retained by P3 to offer this statement, the views expressed herein represent my views alone and not necessarily the views of P3 or any P3 members with respect to any issue.

subject in Docket No. AD17-11 (invited speaker), and filed technical conference comments and post conference comments in Dockets No. ER13-535; No. ER11-2875; No. EL11-20; and No. EL15-64-000. I also appeared before the New Jersey General Assembly in 2011, addressing related issues in discussions of Assembly Bill 3442 and Senate Bill 2381, related to the impacts of state-directed and subsidized capacity procurement for new natural gas units. In ISO-NE, I testified in Dockets No. ER10-787-000; No. EL10-50-000; and No. EL10-57-000 addressing a similar mitigation issue. I participated in multiple stakeholder processes in PJM and NYISO that discussed these issues, including the most recent ones in PJM that evaluated the two alternatives that PJM submitted in the proceedings (Capacity Repricing and MOPR-Ex), related to this Order. I also recently submitted an affidavit in the related (and still open) Docket No. EL18-169. Finally, PJM has had an ongoing stakeholder process as it fashions its own response to the June 29 Order, and I have participated in this process on behalf of several parties.

5. I have, for over a decade, discussed in one form or another, these issues with most of the relevant PJM staff and management, as well as the Independent Market Monitor (“IMM”). I also participated in similar issues and Commission dockets in ISO-NE and NYISO.

6. I have a bachelor’s degree from Swarthmore College and both a master’s and doctorate degree from Carnegie-Mellon University.

Background

7. The June 29 Order determined that the current PJM tariff procedures for dealing with out-of-market subsidies is unjust and unreasonable.² I agree with the Commission’s

² Order at paragraph 156, “For the foregoing reasons, we find, based on this record, that the PJM Tariff allows resources receiving out-of-market support to significantly affect capacity prices in a manner that will cause unjust and unreasonable and unduly discriminatory rates in PJM regardless of the intent motivating the support. We are compelled by the evidence presented by PJM, Calpine, and other parties to these consolidated proceedings to conclude that out-of-market payments by certain PJM states have reached a level sufficient to significantly impact the capacity market clearing prices and the integrity of the resulting price signals on which investors and consumers rely to guide the orderly entry and exit of capacity resources. We cannot rely on such a construct to harness competitive market forces and produce just and

conclusion and logic supporting this finding. It echoes similar comments I have recently made before the Commission in the related proceedings. The Commission also specifically rejected both of PJM's proposed two alternative "fixes," the so-called "Repricing" and the "MOPR-Ex" proposals. Neither alternative was found to result in a just and reasonable means to address the problem of out-of-market payments/subsidies to both new market entrants and existing facilities suppressing wholesale capacity rates rendering them unjust and unreasonable.

Conclusions Related to Commission's Order

8. While certainly not exhaustive, I have three principal conclusions. First, any action that the Commission takes in this paper hearing must satisfy the Commission's basic finding that the status quo is unjust and unreasonable because it allows price suppression from subsidized units. Said another way, any proposal that the Commission approves must be demonstrated not to cause price suppression and to remedy any existing adverse impacts. Second, consistent with my testimony in the underlying proceeding, I support a "Clean MOPR" that mitigates seller offers to a competitive level for any unit receiving a Material Subsidy (as defined by PJM in Docket No. ER18-1314). Such a MOPR would not include any special exemptions for self-supply resources, state procured resources or public power entities other than the ability to offer at its actual costs versus the default competitive level/reference price. Finally, I believe that the existing FRR construct, with certain modifications, provides a viable means for a state, on its own initiative, to procure its own capacity obligations, through means it may prefer other than an interstate centralized capacity construct. I emphasize this approach, though still price suppressive, is quite different than the partial or unit specific FRR alternative that the Commission suggested.

reasonable rates. The PJM Tariff, therefore, is unjust and unreasonable." P3's accompanying comments contain additional citations.

9. The proposed use of a unit specific FRR is fatally flawed and should be rejected. While there are a number of actions that could be taken to reduce the adverse impacts of a unit specific FRR, any reduction in system load by out-of-market subsidized generation inherently suppresses prices and therefore violates the Commission's fundamental finding regarding the unjust and unreasonable nature of any solution that artificially suppresses prices. Below I will explain this in more detail with several examples. In particular I will discuss how PJM's analysis and suggested implementation of the unit specific FRR option results in a level of price suppression that is totally undifferentiated from doing nothing at all to mitigate any subsidies.

Recommendation

10. I strongly support the Commission's call for a Clean MOPR with few or no exceptions that would be uniformly applied to all market participants receiving a Material Subsidy.³ Such a structure would resemble the MOPR-Ex alternative which PJM filed in the underlying docket, but without the broad range of specific exemptions that undo the desired mitigation. While I appreciate the Commission's attempt to offer an alternative to states that seek to favor certain resources, a unit-specific FRR inevitably leads to market-distorting price suppression and is riddled with administrative complexities. I do not believe there are any "fixes" that can be made to the unit specific FRR to make it work in a manner that can address these concerns nor remedy the Commission's finding that price suppression under the status quo causes the PJM rates to be unjust and unreasonable. Instead, the best, indeed perhaps only, path forward for PJM to instill just and reasonable tariff provisions that address the challenges posed by subsidized resources is to support a "Clean MOPR." A "Clean MOPR" can be established while allowing states and LSEs to continue to have the option to pursue full FRR status through slightly modified existing tariff provisions. Similarly, under such an approach, the states would have the opportunity to fully evaluate the economic risks and costs of pursuing such options and the associated mitigation of market seller offers. Indeed, appropriate

³ I adopt the definition of Material Subsidy initially offered by PJM in its initial filing, and as differentiated from the defined Actionable Subsidy. See, <https://www.p3powergroup.com/siteFiles/News/EF343052C741AEA526C2FA792312F0D2.pdf> at 19-20.

mitigation allows the transparent recognition and evaluation of these types of risks prior to creating the state subsidies. This is strongly contrasted with the risk/costs being imposed on existing suppliers who have relied on the Commission's historic preference for a level playing field for comparable products providing comparable service.

11. I would also note that I believe the existing FRR mechanism in PJM could be improved and I encourage the Commission to direct PJM to file a compliance filing that modifies the existing FRR mechanism in the fashion I discuss below.

Any Solution Must Address the Problem of Subsidized Units Unjustly and Unreasonably Suppressing Capacity Market Rates.

12. The starting point for any Commission review of a unit specific FRR proposal is the Commission's own determination that the status quo is unjust and unreasonable based on the existing and continued price suppression due to subsidized participation in the capacity markets. In this context, I believe that any proposal put forward to the Commission has to affirmatively demonstrate that it does not result in price suppression, nor allow the continuation of existing price suppression, or have "loop-holes" that allow circumvention of the mitigation that prevents price suppression. Alternatively, any proposal that has the property of allowing price suppression should have an affirmative obligation to quantify such suppression, and justify it in the context of the ability of the market clearing prices to accurately send entry and exit signals consistent with the pricing, costs and revenues associated with a competitive unsubsidized supplier and at the same time allow the potential for a fully compensatory payment over time to existing and new competitive suppliers. The Commission's finding squarely assigns this burden of proof to those seeking to offer subsidized supply into the market, and the Commission should dismiss any proposals that can not meet this burden.

13. Such a litmus test is a reasonable one and an empirically feasible standard for the Commission to evaluate in response to the June 29 Order.

A Clean MOPR is the Most Effective Means to Address Price Suppression in the Capacity Markets.

14. I refer the Commission to the comments and affidavits I filed in Docket No. ER 18-1314, which has been consolidated into this proceeding, and Docket No. EL18-169, which has not been consolidated into this proceeding. A clean MOPR mitigating all suppliers with a Material Subsidy to an appropriate competitive offer floor price is the best solution to mitigate the price distortion of subsidies provided to select suppliers. It is simple and all-inclusive. Parties that would otherwise have to claim a competitive exemption are exempt in this process, by definition, as they have no Material Subsidy. The only true exception would be the ability to demonstrate costs lower than a default offer cap, presumably $B * \text{Net CONE}$.⁴

15. The Commission suggests that exemptions might be applied to a very broad MOPR and asks whether a self-supply exemption should be considered.⁵ My conclusion in regard to a self-supply exemption is very simple: the only instance in which self-supply should not be subject to mitigation is when the supply is obtained via an all source (new and existing), arms-length, competitive solicitation that is evaluated by an impartial third-party using objective criteria. Any other approach, by definition, has a potentially market-distorting out-of-market subsidy impact due to the purchase and cost assurances associated with public power or IOU ownership and is thus discriminatory. The assurance of recovery (or ability to charge/pass through) prudent costs constitutes a material subsidy which leads to price suppression. The market seller is assured full prudent cost

⁴ PJM is currently considering revisions to the Market Seller Offer Cap that would result in a cap that deviates from the underlying price offer indifference properties that defined the present cap. If this is the case, I believe the specific offer cap for mitigation may have to be reviewed to determine a metric that approximates the existing cap in terms of the empirical criteria for mitigation to a competitive level if PJM should make these modifications.

⁵ Order at paragraph 167: As discussed above, the proposed replacement rate would expand the MOPR to new and existing resources receiving out-of-market support with few to no exemptions. We request comment on the types of MOPR exemptions that should be included. For example, should an exemption be included for self-supplied resources used to meet loads of public power entities? Alternatively, should those resources have the option to use the resource-specific FRR Alternative? What, if any, exceptions should be added to the MOPR for existing resources in the capacity auction?"

recovery regardless of the market-clearing price and thus has an incentive to offer at zero, to assure clearing and the recovery of some funds to offset of regulatory revenues. In turn, the self-supply seller is allowed to lean on the rest of the market when convenient in order to reduce the costs of carrying surplus capacity at the expense of other load, while at the same time suppressing pricing to competitive suppliers.

16. The Commission should also be wary of justifications for such exemptions based on arguments related to “historic business models.” Such models were indeed followed in the past, but they were done so for a different regulatory, business and operational model, not the current RTO market design. The “historic business model” did not have the benefits of a fully integrated and efficient operating market of approximately 150,000 MW, nor did it offer the reliability benefits of such an integrated market. It also wasn’t designed to be compatible with and facilitate retail access. Parties entering into a more efficient market like the current RTO structure did so voluntarily to capture the benefits of scale, efficiency and reliability. These entities also voluntarily accepted the burdens of a competitive platform. While self-supply resources may wish to obtain discriminatory and favorable rules, appealing to historic practices and ignoring the reality and benefits of the RTO structure is not a legitimate justification.

17. A new paradigm was put in place with attendant obligations. The reality of fully participating in an unbiased design which may not accommodate all of a load serving entity’s preferences leads to two options: withdrawing, or accepting the full consequences, both positive and negative (from their own perspective) of a level, non-discriminatory and competitive market platform.

18. Similarly, I believe a discussion by Robert Stoddard, sponsored by NRG, in Docket No. ER 18-1314, also offers an excellent articulation of the market impact of the current self-supply exemption and would urge the Commission to consider those comments in making its own proposal. Specifically, Mr. Stoddard observes, “In the face of massive surpluses, averaging over 7,300 MW in the past five BRAs, self-supply entities should be deferring new builds and buying any capacity shortfall at the low

market prices, rather than exacerbating the surplus and lowering prices even more. The net-short and net-long bands are providing a false sense of security, as evidenced by the fact that at least two “self-supply” providers have cleared 4,152 MWs in the five BRAs in which the exemption and bands were in effect, even though capacity prices were low and no new supply was needed.”⁶ Unambiguously, it would have been far more cost effective to defer these new facilities until a time when the PJM capacity markets were clearing far below the estimated net cost of new entry. But, the “traditional business model” of rate-based, full recovery of investment, provided incentives that overwhelm this benefit of competitive markets, and does so to the detriment of all other suppliers.

The Unit Specific FRR, as Proposed, Leads to the Same Price Suppression as Unmitigated, Subsidized Units Participating in the Capacity Auction.

19. The Commission’s suggested alternative of a unit specific FRR is inherently price suppressive. It actually appears worse than the status quo by allowing unfettered subsidization of existing and new units, corresponding reductions in load, and the displacement of competitive units. All of this still combines to suppress prices artificially due to the subsidies compounding the very problem that the Commission seeks to address.

20. The mechanics of removing both generation and an appropriate level of load from the auction process as suggested by the Commission are slightly different for new entrants and existing units that failed to previously clear the auction without a subsidy, versus application to existing units that have cleared and received a subsidy. However, the negative impacts to the market are similar.

21. When an existing unit that failed to clear the RPM auction receives a subsidy and then clears, under a partial FRR load would be reduced comparable to the size of the subsidized unit (including reserve adjustment). However, the same supply curve that would have existed without the subsidized unit remains up to the previous higher load requirement. This unequivocally results in the same previous existing supply competing

⁶ Stoddard Affidavit attached to NRG Protest, Docket No. ER 18-1314, at page 20.

for less load, and a lower clearing price due to the subsidy. This was the same conclusion I previously reached, and similarly was confirmed by the IMM in its September 26, 2018 report on auction sensitivities and impacts of a partial/unit specific FRR.⁷

22. Consider an actual example in which an existing unit failed to clear an auction, but then received a subsidy. Exelon owns approximately 1350 MWs of the Quad Cities nuclear station (Quad Cities). Quad Cities failed to clear in the 2016 and 2017 RPM auctions.⁸ Failure to clear two consecutive auctions is an indication that a unit is likely no longer economic and should consider retiring. Indeed, in 2016, Exelon announced its intention to shut down Quad Cities on June 1, 2018.⁹ However, in the case of Quad Cities, Illinois provided an out-of-market subsidy in the form of a Zero Emissions Credit in 2017 (“ZEC”), thus enabling Quad Cities to clear the auction in May of 2018. As Exelon made clear in a press release, “Quad Cities cleared the capacity auction as a result of Illinois legislation....”¹⁰

23. Had a “Clean MOPR” been applied to the materially subsidized Quad Cities unit, the Material Subsidy would have been recognized and the offer price mitigated to remove the impact of the subsidy. However, had the unit specific FRR been available (assuming Illinois found a means to provide full compensation for Exelon’s capacity), the unit and the load associated with it would have been removed from PJM’s capacity auction. So, for the unit specific FRR, if applied in the case of the 2018 BRA to Quad Cities, approximately 1350 MWs that would have not cleared the auction due to application of a strong MOPR, would now be considered an FRR resource and the appropriate,

⁷ See, http://www.monitoringanalytics.com/reports/Reports/2018/IMM_MOPR_FRR_Sensitivity_Analyses_Report_20180926.pdf. (“IMM MOPR FRR Report”)

⁸ <http://www.exeloncorp.com/newsroom/pjm-auction-results-release-2017> and <http://www.exeloncorp.com/newsroom/pjm-auction-results-2016>.

⁹ https://qctimes.com/news/local/exelon-begins-steps-to-shut-down-nuclear-plant-in-cordova/article_b88c247c-28be-11e6-b843-23266077cb5a.html

¹⁰ http://www.exeloncorp.com/newsroom/Documents/Press-Release-Exelon%20Announces%20Outcome%20of%202021-2022%20PJM%20Capacity%20Auction_3784.pdf

corresponding load would have been reduced to account for the unit FRR choice (i.e. load declines and pre-subsidy auction supply curve stays the same). The same supply chasing less load results in suppressed prices due to the subsidized partial FRR.

24. For the market as a whole in the 2017 BRA, 165,109.2 MWs cleared, resulting in a 23.3% reserve margin (excluding FRR).¹¹ If we consider the actual 2017 BRA as our base case “without” the FRR unit exemption, we can quickly see the impact of allowing 1350 MW of uncleared capacity to “qualify” under a unit specific exemption. The “with” or unit FRR case for the market would have the exact same supply curve up to the 165,109.2 MWs, but now load would be reduced by the amount of load deemed to be associated with the 1350 MW of unit specific FRR capacity. Assuming a very conservative 25% reserve margin for the FRR capacity and 0% EFORd (for simplicity), load would be reduced by 1080 MWs (80% of 1350 resulting in the 25% reserve e.g. $1350/1080=1.25$). Inherently this means that the price must decline as the supply curve has remained the same (recall the previously uncleared unit priced above the clearing quantity has left the market while the existing cleared units still remain), but in the “with” case the overall demand is reduced by approximately 0.7% (the 1080 MWs). ***This is a generic result.*** Any existing unit that failed to clear and then is subsidized and associated load removed via the unit specific FRR must suppress price as cleared supply remains the same but load decreases. The same is true for any new entry claiming the exemption

25. To put this in context, PJM’s IMM, Dr. Joseph Bowering, conducted an analysis of the capacity auction impacts of adding 1000 MWs of subsidized power in 2011 (in the context of the debate over Maryland and New Jersey efforts to subsidize new natural gas generation). His findings were that such subsidized entry would depress overall market prices by \$1 billion dollars a year.¹² In my very realistic example, the impact of reducing

¹¹ <http://www.pjm.com/-/media/markets-ops/rpm/rpm-auction-info/2020-2021-base-residual-auction-report.ashx?la=en>

¹² *Impact on New Jersey Assembly Bill 3442 on PJM Capacity Market*, The Independent Market Monitor for PJM, dated January 6, 2011, p. 3. [The IMM’s numbers assumes the subsidized resources bid in at zero.]
http://www.monitoringanalytics.com/reports/Reports/2011/NJ_Assembly_3442_Impact_on_PJM_Capacity_Market.pdf

load by 1080 MWs would be expected to be larger (i.e., the removal should roughly equate to the addition of the 1350 MWs of generation).

26. The same type of impact would be associated with FRR unit exemptions for new generation. The prior (without the new generation) supply curve for the system remains the same, but net load served by the remaining generation decreases, directly resulting in lower prices. While “counting” rules related to the amount of load removed under the type of proposal suggested by the Commission can mitigate the magnitude of the suppression, *it can’t be eliminated if any load is removed*. In other words, as the IMM concluded, “There is no safe level and no level of resource specific FRR that would not significantly suppress prices.”¹³

PJM’s Modeling of the Unit Specific FRR In Stakeholder Discussions Confirms That a Unit Specific FRR Results in Price Suppression for Unsubsidized Resources.

27. During the stakeholder discussions leading up to its filing, PJM presented its own modeling to reflect what an implementation of the Commission’s unit specific, or partial FRR, would look like.

28. PJM basically came to the same findings I summarize above—there is no distinction between the unit specific FRR proposal of removing both subsidized generation and comparable load versus simply the full inclusion of unmitigated, subsidized supply offering in at zero. In both cases the result is the same, and the level of price suppression is identical.

29. Given this realization, PJM’s proposed modeling of a unit-specific FRR was to simply include all supply with an actionable subsidy in the auction as price takers, and use the resulting capacity auction clearing price to compensate all other supply, i.e. all other supply gets a price based on the presence of all subsidized units in the “bottom” of the supply curve. This is identical to no mitigation at all.

¹³ See, IMM MOPR FRR Report, p. 2.

30. PJM describes this process in its own summary of its proposal provided multiple times in the stakeholder process (the term ReCO refers to PJM title for the partial FRR/carve out approach):

--Resources and the associated load that are part of ReCO will be included in the clearing of RPM auctions.

--The ReCO resources will be self-scheduled in the auction and no adjustments will be made to the demand curve

--In the capacity market settlement process, the ReCO resources will not be paid the RPM clearing price and the associated load will not be charged for capacity

--Cleared capacity from ReCO resources will not be paid the clearing price.

--The dollars not paid to such resources will be allocated as a prorata credit back to all PJM load in the state subsidizing the specific resources on the basis of such loads' Locational Reliability Charges"¹⁴

31. I personally participated in the stakeholder process in which this approach was presented by PJM. I personally on several occasions asked Mr. Keech of PJM (the PJM subject matter expert presenting the summary of PJM's proposals) if he agreed that the pricing for the rest of supply (those not receiving subsidies) would be the same under this approach versus a scenario in which no mitigation had been applied. In each instance he agreed.¹⁵

32. As part of this partial FRR implementation without any mitigation impact, PJM also resolves several issues raised by the Commission, but their answers are very troubling. First, automatically the associated load "removed" is set at the same reserve margin as the rest PJM due to the fact that the load is not actually removed, but rather remains, being notionally matched with the subsidized price taking supply. This

¹⁴ PJM Stakeholder Meeting, August 15, 2018 on Capacity Market Reforms, PJM slide presentation: <https://pjm.com/-/media/committees-groups/committees/mrc/20180815-special/20180815-item-02-current-approach-to-ferc-order-on-capacity-markets.ashx>

¹⁵ These statements are based on my contemporaneous notes of PJM stakeholder meetings.

demonstrates that the status quo FRR approach, that sets the required reserves lower than the clearing RPM level of reserves (fixed at the IRM for the withdrawing area) actually would suppress prices more than PJM's no mitigation equivalent. (E.g. more load could be removed under the status quo FRR approach setting reserves at the IRM for any given MW level of subsidized entry due to the lower reserve requirement).¹⁶ Under the PJM "equivalent" approach pricing is just set to reflect the financial result that occurs by placing the subsidized generation into the auction as a price taker. This is the same as if load was uniformly pro-rated down (E.g. this is equivalent to shifting the supply and demand curves to the left by the same amounts as was also noted by Dr. Bowring).¹⁷

33. Second, by recognizing the partial FRR effectively does nothing to mitigate the price suppression a related question is resolved in terms of Capacity Transfer Rights. These are similarly supplied pro-rata to the "associated" load in PJM's proposed approach. PJM stated it favored this approach because it was equivalent to the partial FRR suggested by the Commission, but simple to implement. While this does make implementation easy, it also demonstrates the great difficulty to actually reflect the removal of specific load, which is also implied by the Commission's suggestion. Such an action would trigger the need for a very complex analysis of how transfer limits and reserves need to be adjusted as location specific load is modified. PJM effectively acknowledged this difficulty by defaulting to the equivalence of no mitigation at all, the associated price suppression, and the use of a financial equivalent to the reduction of load and generation.

34. The only distinction that PJM's approach would make from fully unmitigated participation would be with respect to the cash flow for the units with an actionable subsidy. Subsidized units would not receive the suppressed auction price directly from PJM. Rather those funds would be directed to the appropriate subsidizing entity acting on

¹⁶ I address a potential remedy for this problem in the status quo FRR later in the context of appropriate adjustments to an FRR applied on a zonal or state level as currently allowed.

¹⁷ IMM MOPR FRR Report, p. 1.

behalf of load or pro-rata to load (for the purposes of this discussion assume that is the state in which the subsidized facility is located that receives the credit from PJM.)

35. However, this is a distinction with no real difference. The funds that would otherwise go to the supplier in the auction now would flow to the state (or directly to LSE/load as a load credit). The state could then redistribute them in any fashion consistent with its own objectives, which would not necessarily be any different that had the payment gone directly to the supplier. This can be seen by simple examples. First, consider the case in which under a “no mitigation scenario” a supplier would receive \$200/Mw-day from the state as a subsidy and agree to refund any capacity payments it received from PJM to the state.

36. This type of contract for differences approach was the general nature of the agreements proposed by Maryland and New Jersey that underlie the *Hughes* decision. Under PJM’s partial FRR/carve out, implementation would now actually be easier, as the capacity auction credits could flow directly to the state (or load) and the same \$200/MW-day flows to the supplier from the state (i.e. instant contract for differences). Variants of this could include adjustment formulas for different ranges of auction results, but in all cases the flow of funds is simply adjusted to achieve the same result. A second example might be where the state agreed to pay a \$200/MW-day to a supplier and allow the supplier to keep the auction revenues. In this situation the only adjustment would be that the capacity auction payments would first flow to the state (or load), and then, under this structure, be paid to the supplier via a state payment (presumably either directly from the PJM credit, or from a load surcharge similar to how the subsidy might be collected.)¹⁸

37. The implications for load are again unchanged except for the flow of funds. However, the state recovered its subsidy costs without the PJM program would still apply and the auction payments to all other suppliers would remain unchanged.

¹⁸ There is no material distinction between funds flowing back to the state or to load as a credit in terms of the result of load not paying the auction price for the subsidized supply. The dollars can always be adjusted by retail credits and charges. While this allocation is certainly of concern to load, other suppliers are indifferent and still see the fully suppressed market price from the subsidy.

38. Ultimately, because PJM recognized that the partial unit specific FRR or carve out had no real impacts and was effectively just a juggling of financial flows, any number of different arrangements would be possible between load and supplier charges. The important point to recognize is that the unit specific FRR leads to the exact price suppression that the Commission seeks to avoid.

39. The inevitable, and perhaps at some level regrettable, conclusion that I reach is that a unit specific FRR just doesn't work. From the view of other market participants, from one perspective load will be decreasing for the same level of supply whether the exempted unit is a new entrant or an uncompetitive existing supplier. This makes the price suppression worse, not better. Or alternatively, seen in the context of PJM's proposal, the effect would be as if no mitigation at all applied. Either way, the suppressed capacity prices stemming from the participation of unmitigated, subsidized units remain and PJM's capacity market rates remain unjust and unreasonable .

The Existing PJM FRR Mechanism.

40. As the Commission recognized in the June 29 order, the existing FRR mechanism provides a viable means for a state to procure capacity on its own outside of the centralized PJM capacity procurement. Several load serving entities have availed themselves of this option and there is no reason why any state in PJM could not do the same. The PJM capacity markets were designed to procure capacity in the least costs means. If a state believes it can procure a more desirable mix of capacity resources at a price it is comfortable paying, it has the ability to do so under PJM's existing tariff. But in doing so, any state would have to remove all of their load from the capacity auction market, and assume the full responsibilities for adequacy planning.

41. The existing FRR has many of the same features as the proposed unit specific FRR. FRR entities receive no capacity revenue (their revenue requirements would have to be met from state-based subsidies and/or load payments). FRR generators have

capacity performance obligations. FRR load does not pay any PJM capacity charges. PJM has developed a series of rules over the years and the construct largely works. Because FRR is elected on a LSE or more typically a zonal LDC basis, rather than unit specific basis, questions regarding load allocation are easily addressed. The existing FRR mechanism does admittedly raise similar price suppression concerns, although those concerns are more easily addressed in the existing construct as opposed to the proposed unit specific process. Further, by requiring a state or zonal long-term commitment to FRR, the true long-term costs of price discrimination and suppression will likely be recognized by the associated regulatory bodies making such decisions.

42. If this path is followed there are some changes that would be appropriate to the current FRR tariff rules. For example, currently the FRR entity only has to procure resources to meet the IRM (Installed Reserve Margin) whereas the rest of the pool has been procuring at a higher reserve level value associated with the downward sloping demand curve. The net effect is that the lower reserve margin for FRR entities effectively provides them a free ability to lean on the rest of the RTO for reliability support in excess of the level they are procuring.

43. Similarly, the current rules allow (with limits) FRR entities to purchase and sell bilaterally with the rest of the pool. This again encourages/results in a form of leaning on the rest of the pool to balance obligations, and fund the FRR entities excesses when carrying excess supply. This also should be addressed and modified to more fully reflect the objective of isolating the impact of subsidies from the portions of the market that have chosen not to engage in these practices. The Commission should direct PJM to explore correcting these and other issues as part of an abbreviated stakeholder process in advance of a PJM compliance filing.

44. This concludes my comments.

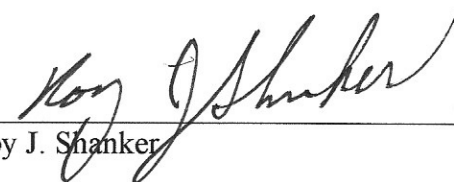
**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Calpine Corporation)	
	)	Docket No. EL16-49-000
)	
v.)	
PJM Interconnection, L.L.C.)	
)	
PJM Interconnection, L.L.C.	)	Docket No. ER18-1314-000
	)	Docket No. ER18-1314-001
)	
PJM Interconnection, L.L.C.	)	Docket No. EL18-178-000
)	
		(Consolidated)

AFFIDAVIT

I, Roy J. Shanker, do hereby swear and affirm under penalty of law that the statements in the foregoing Affidavit of Roy J. Shanker, Ph.D. are true to the best of my knowledge, information and belief.

Executed this 30th day of September, 2018.



Roy J. Shanker

**QUALIFICATIONS
AND
EXPERIENCE OF
DR. ROY J. SHANKER**

EDUCATION:

Swarthmore College, Swarthmore, PA
A.B., Physics, 1970

Carnegie-Mellon University, Pittsburgh, PA
Graduate School of Industrial Administration
MSIA Industrial Administration, 1972
Ph.D., Industrial Administration, 1975

Doctoral research in the development of new non-parametric multivariate techniques for data analysis, with applications in business, marketing and finance.

EXPERIENCE:

1981 - Independent Consultant
Present P.O. Box 1480
Pebble Beach, CA 93953

Providing management and economic consulting services in natural resource-related industries, primarily electric and natural gas utilities.

1979-81 Hagler, Bailly & Company
2301 M Street, N.W.
Washington, D.C.

Principal and a founding partner of the firm; director of electric utility practice area. The firm conducted economic, financial, and technical management consulting analyses in the natural resource area.

1976-79 Resource Planning Associates, Inc.
1901 L Street, N.W.

Washington, D.C.

Principal of the firm; management consultant on resource problems, director of the Washington, D.C. utility practice. Direct supervisor of approximately 20 people.

1973-76 Institute for Defense Analysis
Professional Staff
400 Army-Navy Drive
Arlington, VA

Member of 25 person doctoral level research staff conducting economic and operations research analyses of military and resource problems.

RELEVANT EXPERIENCE:

2018

244—On behalf of Joint Commentors. Federal Energy Regulatory Commission Docket EL18-34. Participation in the preparation of comments addressing PJM's proposed fast start pricing modifications and related price formation issues.

243—On behalf of the PJM Power Providers Group. Federal Energy Regulatory Commission Dockets EL17-32 and EL17-36. Pre-Technical Conference Comments and participant technical conference regarding seasonal products and specific related reliability and forecasting questions from Commission Staff.

2017

242—On behalf of the PSEG Companies. Federal Energy Regulatory Commission Docket No. ER13-535-000. Affidavit regarding implementation of Court of Appeals remand to FERC of the PJM capacity market Minimum Offer Price Rule.

241-- In the United States Court of Appeals for the Second Circuit. Case No. 17-2654. Co-writer/sponsor of the Brief of Energy Economists as Amici Curiae in Support of Plaintiffs-Appealants-Reversal. Comments regarding the impacts of subsidies on the operation of organized electric markets.

240—In the United States Court of Appeals for the Seventh Circuit. No. 17-2433. Co-writer/sponsor of the Brief of Energy Economists as Amici

Cucrae in Support of Plaintiffs-Appealants. Comments regarding the impacts of subsidies on the operation of organized electric markets.

239—Invited speaker Federal Energy Regulatory Commission technical session, Docket AD17-11. Comments on the appropriate incorporation of state policies in wholesale electric markets. Submission of post technical session comments.

238—On behalf of PJM Power Providers. Federal Energy Regulatory Commission Dockets EL17-36 and EL17-32 addressing the current Capacity Performance design and criticisms related to the exclusion of an inferior seasonal product. Explanation of how PJM establishes its adequacy targets and whether or not the asserted criticisms were valid.

2016

237- On behalf of DC Energy, Vitol, Intertia Power, Saracen Energy East. Federal Energy Regulatory Commission Dockets EL16-6, ER16-121. Submission of post technical session statement regarding PJM FTR market “netting” proposal.

236-On behalf of DC Energy, Vitol, Intertia Power, Saracen Energy East. Federal Energy Regulatory Commission Dockets EL16-6, ER16-121. Participant in two Technical Session Panels addressing PJM FTR market design and deficiency in the pending proposal to remove netting in the market settlement.

2015

235- On behalf of the Electric Power Supply Association. Federal Energy Regulatory Commission Dockets EL15-70, 71, 72, 82. Affidavit regarding MISO capacity market design and also addressing use of opportunity costs in offers.

234-On behalf of the Electric Power Supply Association. Federal Energy Regulatory Commission Dockets EL15-70, 71, 72, 82. Discussant in technical session addressing the establishment of opportunity costs as the basis for capacity reference pricing in the MISO Planning Resource Auctions.

233-On behalf of Dominion Virginia Power. Federal Energy Regulatory Commission Docket ER15-1966. Affidavit regarding changing economic incentives for suppliers associated with the modification of PJM’s calculation of Lost Opportunity Costs.

232-On behalf of “Indicated Suppliers” Federal Energy Regulatory Commission Docket No. EL15-64-000. Testimony addressing the appropriateness of proposed changes to the NYISO buyer side mitigation exemptions.

231-On behalf of Hydro Quebec, Energy Services U.S. Federal Energy Regulatory Commission Docket No. ER15-623. Affidavit addressing the consistent treatment of energy imports under PJM’s Capacity Performance proposal.

230-Before the Supreme Court of the United States, No. 14-995, On Petition for a Writ of Certiorari to the United States Court of Appeals for the Third Circuit. Brief of electrical engineers, scientists and economists as amici curiae in support of petitioners. Metropolitan Edison et. al. versus Pennsylvania Public Utility Commission et. al.
http://www.americanbar.org/content/dam/aba/publications/supreme_court_preview/briefs_2015_2016/14-840_Borlick_et_al.pdf

2014

229-On behalf of Benton County Wind Farm. United States District Court Southern District of Indiana, Indianapolis Division, Civil Action No. 1:13-cv-1984-SEB-TAB. Expert Reports addressing custom and practice in electric power purchase agreements.

228-On behalf of FirstEnergy Services. FERC Docket EL14-55. Affidavit related to the appropriate characterization of Demand Response in Capacity Markets reflecting performance as the reduction of retail energy consumption.

227)-Federal Energy Regulatory Commission. Docket RM10-17. On my own behalf, a statement regarding the ability of the PJM capacity and energy markets to clear in the transition from any determination that demand response would be excluded jurisdictionally from wholesale markets. This could in turn result in a more appropriate representation of retail demand response.

226) Illinois Commerce Commission. Matter: No. 13-0657. On behalf of Commonwealth Edison Company. Testimony regarding the operation of the PJM regional transmission expansion planning process in general and particularly with regards to the preservation of long-term transmission rights (Stage 1A Auction Revenue Rights), and the consequences that occur when such mandated rights are infeasible.

225-Federal Energy Regulatory Commission. Docket ER14-1579. On behalf of H-P Energy. Affidavit explaining importance of property rights and associated contracts within the PJM transmission planning process, particularly as they pertain to Upgrade Construction Service Agreements.

2013

224-Federal Energy Regulatory Commission. Docket No. ER14-456. On behalf of NextEra Energy to analyze a proposed modification to the PJM Tariff allowing for “easily resolved constraints” to be address by transmission upgrades without any analyses of benefits.

223-Federal Energy Regulatory Commission. Docket No. ER14-504. Affidavit on behalf of PJM Power Producers addressing the interaction between the PJM adequacy planning processes and the formulation of saturation constraints on Limited and Extended Summer Demand Response products.

222-Federal Energy Regulatory Commission. Docket AD13-7. Invited speaker on the Commission’s technical session regarding capacity markets in RTO’s. Comments addressed basic principles of market design, market features, and consequences of market failures and deviations from design principles.

221-Federal Energy Regulatory Commission. Docket No. EL13-62 on behalf of TC Ravenswood LLC. Two affidavits addressing the treatment of reliability support services agreements and associated capacity in the NYISO capacity market design.

2012

220-Federal Energy Regulatory Commission. Docket No. ER12-715-003. On behalf of First Energy Services Company. An affidavit and testimony addressing the appropriateness of the application of a proposed new MISO tariff provision after the fact to a withdrawing MISO member.

219-Federal Energy Regulatory Commission. Docket ER13-335. On behalf of Hydro Quebec U.S. Affidavit addressing appropriate application of ISO-NE Market Rule 1/ Tariff with respect to the qualification of new external capacity to participate in the Forward Capacity Market.

218-Federal Energy Regulatory Commission. Docket IN12-4. On behalf of Deutsche Bank Energy Trading. Affidavit regarding a review of specific transactions, related congestion revenue rights, and deficiencies in

CAISO tariff implementation during periods when market software produces multiple feasible pricing solutions.

217-Federal Energy Regulatory Commission. Docket No. ER12-715-003. On behalf of FirstEnergy Services Company. Affidavit regarding implementation of the MISO Tariff with respect to the determination of appropriate exit fees and charges related to certain transmission facilities.

216-Federal Energy Regulatory Commission. Docket No. IN12-11. On behalf of Rumford Paper Company. Affidavit regarding free riding behavior in the design of demand response programs, and its relationship to accusations of market manipulation.

215-Federal Energy Regulatory Commission. Docket No. IN12-10. On behalf of Lincoln Paper and Tissue LLC. Affidavit regarding relationship of demand response behavior and value established in Order 745 to claimed market impacts associated with accusations of market manipulation.

214-Federal Energy Regulatory Commission. Docket No. AD12-16-000. On behalf of PJM Power Providers, testimony regarding deliverability of capacity between the MISO and PJM RTO's and associated basic adequacy planning concepts.

213-United States Court Of Appeals, District of Columbia Circuit. Electric Power Supply Association, et al (Petitioners) v. Federal Energy Regulatory Commission et al (Respondents) Nos. 11-1486. Amici Curiae brief regarding the appropriate pricing of demand reduction services in wholesale markets vis a vis the FERC determinations in Order 745.

212-United States Supreme Court. Metropolitan Edison Company and Pennsylvania electric Company (Petitioners), Pennsylvania Public Utility Commission (Respondent) (No. 12-4) Amici Curiae brief regarding the nature of physical losses in electric transmission and relationship to proper marginal cost pricing of electric power and the marginal cost of transmission service.

2011

211-Federal Energy Regulatory Commission Docket No. ER12-513-000. On behalf of PJM Power Providers, testimony regarding the establishment of system wide values for the net cost of new entry related to modifications of the Reliability Planning Model.

210-Federal Energy Regulatory Commission Docket No. EL11-56-000, on behalf of First Energy Services. Affidavit regarding the appropriateness of proposed transmission cost allocation of Multi-Value Projects to an exiting member of the Midwest Independent System Operator.

209-Federal Energy Regulatory Commission Docket No. ER11-4081-000, on behalf of “Capacity Suppliers”. Affidavit addressing correct market design elements for Midwest Independent System Operator proposed resource adequacy market.

208-Public Utility Commission of Ohio, Case Nos. 11-346-EL-SSO,11-348-EL-SSO,Nos. 11-349-EL-AAM, 11-350-EL-AAM, on behalf of First Energy Services. Testimony regarding the interaction between the capacity default rates for retail access under the PJM Fixed Resource Requirement and the PJM Reliability Planning Model valuations.

207-Federal Energy Regulatory Commission Dockets No. ER11-2875, EL11-20, Staff Technical Conference on behalf of PJM Power Providers, addressing self supply and the Fixed Resource Requirement elements of PJM’s capacity market design.

206-New Jersey Board of Public Utilities, Docket Number EO11050309 on behalf of PSEG Companies. Affidavit addressing the implications of markets and market design elements, and regulatory actions on the relative risk and trade-offs between capital versus energy intensive generation investments.

205-Federal Energy Regulatory Commission Docket No. ER11-2875. Affidavit and supplemental statement on behalf of PJM Power Providers addressing flaws in the PJM tariff’s Minimum Offer Price Rule regarding new capacity entry and recommendations for tariff revisions.

204-Federal Energy Regulatory Commission Docket No. EL11-20. Affidavit on behalf of PJM Power Providers addressing flaws in the PJM tariff’s Minimum Offer Price Rule regarding new capacity entry.

203-Federal Energy Regulatory Commission Docket Nos. ER04-449. Affidavit and supplemental statement on behalf of New York Suppliers addressing the appropriate criteria for the establishment of a new capacity zone in the NYISO markets.

2010

202-New Jersey State Assembly and Senate. Statements on behalf of the Competitive Supplier Coalition addressing market power and reliability impacts of proposed legislation, Assembly Bill 3442 and Senate Bill 2381.

201-Federal Energy Regulatory Commission. Docket ER11-2183. Affidavit on behalf of First Energy Services Company addressing default capacity charges for Fixed Resource Requirement participants in the PJM Reliability Pricing Model capacity market design.

200-Federal Energy Regulatory Commission. Docket ER11-2059 Affidavit on behalf of First Energy Services Company addressing deficiencies and computational problems in the proposed “exit charges” for transmission owners leaving the MISO RTO related to long term transmission rights.

199-Federal Energy Regulatory Commission Docket RM10-17. Invited panelist addressing metrics for cost effectiveness of demand response and associated cost allocations and implications for monopsony power.

198-Federal Energy Regulatory Commission Consolidated Dockets ER10-787-000, EL10-50-000, and EL10-57-000. Two affidavits on behalf of the New England Power Generators Association regarding ISO-NE modified proposals for alternative price rule mitigation and zonal definitions/functions of locational capacity markets.

197-Federal Energy Regulatory Commission Docket No. ER10-2220-000. Affidavit on behalf of the Independent Energy Producers of New York. Addressing rest of state mitigation thresholds and procedures for adjusting thresholds for frequently mitigated units and reliability must run units.

196-Federal Energy Regulatory Commission Docket PA10-1. Affidavit on behalf of Entergy Services related to development of security constrained unit commitment software and its performance.

195-Federal Energy Regulatory Commission Docket No. ER09-1063-004. Testimony on behalf of the PJM Power Providers Group (P3) regarding the proposed shortage pricing mechanism to be implemented in the PJM energy market. Reply comments related to a similar proposal by the independent market monitor.

194-PJM RTO. Statement regarding the impact of the exercise of buyer market power in the PJM RPM/Capacity market. Panel discussant on the issue at the associated Long Term Capacity Market Issues Symposium.

193-Federal Energy Regulatory Commission Docket No. ER10-787-000. Affidavit on behalf of New England Power Generators Association addressing proper design of the alternative price rules (APR) for the ISO-NE Forward Capacity Auctions. Second affidavit offered in reply. Supplemental affidavit also submitted

192-Federal Energy Regulatory Commission Docket No. RM10-17-000. Affidavit on behalf of New England Power Generators Association addressing proper pricing for demand response compensation in organized wholesale regional transmission organizations.

191-Federal Energy Regulatory Commission Docket No. RM10-17-000, Affidavit on my on behalf regarding inconsistent representations made between filings in this docket and contemporaneous materials presented in the PJM stakeholder process.

2009

190-Federal Energy Regulatory Commission Docket No. ER09-1682. Two affidavits on behalf of an un-named party regarding confidential treatment of market data coupled with specific market participant bidding, and associated issues.

189-American Arbitration Association, Case No. 75-198-Y-00042-09 JMLE, on behalf of Rathdrum Power LLC. Report on the operation of specific pricing provision of a tolling power purchase agreement.

188-Federal Energy Regulatory Commission. Docket No. IN06-3-003. Analyses on behalf of Energy Transfer Partners L.P. regarding trading activity in physical and financial natural gas markets.

187-Federal Energy Regulatory Commission. Docket No. ER08-1281-000. Analyses on behalf of Fortis Energy Trading related to the impacts of loop flow on trading activities and pricing.

186-American Arbitration Association. Report on behalf of PEPCO Energy Services regarding several trading transactions related to the purchase and sale of Installed Capacity under the PJM Reliability Pricing Model.

185-Federal Energy Regulatory Commission Docket No. EL-0-47. Analyses on behalf of HQ Energy services (U.S.) regarding pricing and sale of energy associated with capacity imports into ISO-NE.

184-Federal Energy Regulatory Commission Docket No. ER04-449 019, Affidavit on behalf of HQ Energy Services (U.S.) regarding the implementation of the consensus deliverability plan for the NYISO, and associated reliability impacts of imports.

183-Federal Energy Regulatory Commission Docket ER09-412-000, ER05-1410-010, EL05-148-010. Affidavit and Reply Affidavit on behalf

of PSEG Companies addressing proposed changes to the PJM Reliability Pricing Model and rebuttal related to other parties' filings.

2008

182-Pennsylvania Public Service Commission. *En Banc* Public Hearing on "Current and Future Wholesale Electricity Markets", comments regarding the design of PJM wholesale market pricing and state restructuring.

181-Maine Public Utility Commission. Docket No. 2008-156. Testimony on behalf of a consortium of energy producers and suppliers addressing the potential withdrawal of Maine from ISO New England and associated market and supplier response.

180-Federal Energy Regulatory Commission. Docket No. EL08-67-000. Affidavit on behalf of Duke Energy Ohio and Reliant Energy regarding criticisms of the PJM reliability pricing model (RPM) transitional auctions.

179-Federal Energy Regulatory Commission. Docket AD08-4, on behalf of the PJM Power Providers. Statement and participation in technical session regarding the design and operation of capacity markets, the status of the PJM RPM market and comments regarding additional market design proposals.

178-Federal Energy Regulatory Commission. Docket ER06-456-006, Testimony on behalf of East Coast Power and Long Island Power Authority regarding appropriate cost allocation procedures for merchant transmission facilities within PJM.

2007

177-FERC Docket No. EL07-39-000. Testimony on behalf of Mirant Companies and Entergy Nuclear Power Marketing regarding the operation of the NYISO In-City Capacity market and the associated rules and proposed rule modifications.

176-FERC Dockets: RM07-19-000 and AD07-7-000, filing on behalf of the PJM Power Providers addressing conservation and scarcity pricing issues identified in the Commission's ANOPR on Competition.

175-FERC Docket No. EL07-67-000. Testimony and reply comments on behalf of Hydro Quebec U.S. regarding the operation of the NYISO TCC

market and appropriate bidding and competitive practices in the TCC and Energy markets.

174-FERC Docket Nos. EL06-45-003. Testimony on behalf of El Paso Electric regarding the appropriate interpretation of a bilateral transmission and exchange agreement.

2006

173-United States Bankruptcy Court for the Southern District of New York. Case No. 01-16034 (AJG). Report on Behalf of EPMI regarding the properties and operation of a power purchase agreement.

172-FERC Docket No. EL05-148-000. Testimony regarding the proposed Reliability Pricing Model settlement submitted for the PJM RTO.

171-FERC Docket No. ER06-1474-000, FERC. Testimony on behalf of the PSEG Companies regarding the PJM proposed new policy for including “market efficiency” transmission upgrades in the regional transmission expansion plan.

170-FERC Docket No. EL05-148-000, FERC. Participation in Commission technical sessions regarding the PJM proposed Reliability Pricing Model.

169-FERC Docket No. EL05-148-000, FERC. Comments filed on behalf of six PJM market participants concerning the proposed rules for participation in the PJM Reliability Pricing Model Installed Capacity market, and related rules for opting out of the RPM market.

168-FERC Docket No. ER06-407-000. Testimony on behalf of GSG, regarding interconnection issues for new wind generation facilities within PJM.

2005

167-FERC Docket No. EL05-121-000, Testimony on behalf of several PJM Transmission Owners (Responsible Pricing Alliance) regarding alternative regional rate designs for transmission service and associated market design issues.

166-FERC Technical Conference of June 16, 2005. (Docket Nos. PL05-7-000, EL03-236-000, ER04-539-000). Invited participant. Statement regarding the operation of the PJM Capacity market and the proposed new Reliability Pricing Model Market design.

165-American Arbitration Association Nos. 16-198-00206-03 16-198-002070. On behalf of PG&E Energy Trading. Analyses related to the

operation and interpretation of power purchase and sale/tolling agreements and electrical interconnection requirements.

164-Arbitration on behalf of Black Hills Power, Inc. Expert testimony related to a power purchase and sale and energy exchange agreement, as well as FERC criteria related to the applicable code and standards of conduct.

2004

163-Federal Energy Regulatory Commission. Docket No. Docket No. EL03-236-003 Testimony on behalf of Mirant companies relating to PJM proposal for compensation of frequently mitigated generation facilities.

162-Federal Energy Regulatory Commission. Docket No. ER03-563-030. Testimony on behalf of Calpine Energy Services regarding the development of a locational Installed Capacity market and associated generator service obligations for ISO-NE. Supplemental testimony filed 2005.

161-Federal Energy Regulatory Commission. Docket No. EL04-135-000. Testimony on behalf on the Unified Plan Supporters regarding implications of using a flow based rate design to allocate embedded costs.

160-Federal Energy Regulatory Commission. Docket No. ER04-1229-000. Testimony on behalf of EME Companies regarding the allocation and recovery of administrative charges in the NYISO markets.

159-Federal Energy Regulatory Commission. Dockets No. EL01-19-000, No. EL01-19-001, No. EL02-16-000, EL02-16-000. Testimony on behalf of PSE&G Energy Resources and Trade regarding pricing in the New York Independent System Operator energy markets.

158-Federal Energy Regulatory Commission. Invited panelist regarding performance based regulation (PBR) and wholesale market design. Comments related to the potential role of PBR in transmission expansion, and its interaction with market mechanisms for new transmission.

157-Federal Energy Regulatory Commission. Docket No. ER04-539-000 Testimony on behalf of EME Companies regarding proposed market mitigation in the energy and capacity markets of the Northern Illinois Control Area.

156-Federal Energy Regulatory Commission. Standardization of Generator Interconnection Agreements and Procedures Docket No. RM02-1-001, Order 2003-A, Affidavit on Behalf of PSEG Companies

regarding the modifications on rehearing to interconnection crediting procedures.

155-Federal Energy Regulatory Commission. Dockets ER03-236-000,ER04-364-000,ER04-367-000,ER04-375-000. Testimony on behalf of the EME Companies regarding proposed market mitigation measures in the Northern Illinois Control Area of PJM.

154-Federal Energy Regulatory Commission. Dockets PL04-2-000, EL03-236-000. Invited panelist, testimony related to local market power and the appropriate levels of compensation for reliability must run resources.

2003

153-American Arbitration Association. 16 Y 198 00204 03. Report on behalf of Trigen-Cinergy Solutions regarding an energy services agreement related to a cogeneration facility.

152-Federal Energy Regulatory Commission. Docket No. EL03-236-000. Testimony on behalf of EME Companies regarding the PJM proposed tariff changes addressing mitigation of local market power and the implementation of a related auction process.

151-Federal Energy Regulatory Commission. Docket No. PA03-12-000. Testimony on behalf of Pepco Holdings Incorporated regarding transmission congestion and related issues in market design in general, and specifically addressing congestion on the Delmarva Peninsula.

150-Federal Energy Regulatory Commission. Docket Nos. ER03-262-007, Affidavit on behalf of EME Companies regarding the cost benefit analysis of the operation of an expanded PJM including Commonwealth Edison.

149-Supreme Court of the State of New York, Index No. 601505/01. Report on behalf of Trigen-Syracuse Energy Corporation regarding energy trading and sales agreements and the operation of the New York Independent System Operator.

148-Federal Energy Regulatory Commission. Docket No. ER03-262-000. Affidavit on behalf of the EME Companies regarding the issues associated with the integration of the Commonwealth Edison Company into PJM.

147-Federal Energy Regulatory Commission. Docket No. ER03-690-000. Affidavit on behalf of Hydro Quebec US regarding New York ISO market rules at external generator proxy buses when such buses are deemed non-competitive.

146-Federal Energy Regulatory Commission. Docket RT01-2-006,007. Affidavit on behalf of the PSEG Companies regarding the PJM Regional Transmission Expansion Planning Protocol, and proper incentives and structure for merchant transmission expansion.

145-Federal Energy Regulatory Commission. Docket No. ER03-406-000. Affidavit on behalf of seven PJM Stakeholders addressing the appropriateness of the proposed new Auction Revenue Rights/Financial Transmission Rights process to be implemented by the PJM ISO.

144-Federal Energy Regulatory Commission. Docket No. ER01-2998-002. Testimony on behalf of Pacific Gas and Electric Company related to the cause and allocation of transmission congestion charges.

143-Federal Energy Regulatory Commission. Docket No. RM01-12-000. On behalf of six different companies including both independent generators, integrated utilities and distribution companies comments on the proposed resource adequacy requirements of the Standard Market Design.

142-United States Bankruptcy Court, Northern District of California, San Francisco Division, Case No. 01-30923 DM. On behalf of Pacific Gas and Electric Dr. Shanker presented testimony addressing issues related to transmission congestion, and the proposed FERC SMD and California MD02 market design proposals.

2002

141-Arbitration. Testimony on behalf of AES Ironwood regarding the operation of a tolling agreement and its interaction with PJM market rules.

140-Federal Energy Regulatory Commission. Docket No. RM01-12-000. Dr. Shanker was asked by the three Northeast ISO's to present a summary of his resource adequacy proposal developed in the Joint Capacity Adequacy Group. This was part of the Standard Market Design NOPR process.

139-Federal Energy Regulatory Commission. Docket No. ER02-456-000. Testimony on behalf of Electric Gen LLC addressing comparability of a contract among affiliates with respect to non-price terms and conditions.

138-Circuit Court for Baltimore City. Case 24-C-01-000234. Testimony on behalf of Baltimore Refuse Energy Systems Company regarding the appropriate implementation and pricing of a power purchase agreement and related Installed Capacity credits.

137-Federal Energy Regulatory Commission. Docket No. RM01-12-000. Comments on the characteristics of capacity adequacy markets and alternative market design systems for implementing capacity adequacy markets.

2001

136-Federal Energy Regulatory Commission. Docket ER02-456-000. Testimony on behalf of Electric Gen LLC regarding the terms and conditions of a power sales agreement between PG&E and Electric Generating Company LLC.

135-Delaware Public Service Commission. Docket 01-194. On behalf of Conectiv et al. Testimony relating to the proper calculation of Locational Marginal Prices in the PJM market design, and the function of Fixed Transmission Rights.

134-Federal Energy Regulatory Commission. Docket No. IN01-7-000 On behalf of Exelon Corporation . Testimony relating to the function of Fixed Transmission Rights, and associated business strategies in the PJM market system.

133-Federal Energy Regulatory Commission. Docket No. RM01-12-000. Comments on the basic elements of RTO market design and the required market elements.

132-Federal Energy Regulatory Commission. Docket No. RT01-99-000. On behalf of the One RTO Coalition. Affidavit on the computational feasibility of large scale regional transmission organizations and related issues in the PJM and NYISO market design.

131-Arbitration. On behalf of Hydro Quebec. Testimony related to the eligibility of power sales to qualify as Installed Capacity within the New York Independent system operator.

130-Virginia State Corporation Commission. Case No. PUE000584. On behalf of the Virginia Independent Power Producers. Testimony related to the proposed restructuring of Dominion Power and its impact on private power contracts.

129-United States District Court, Northern District of Ohio, Eastern Division, Case: 1:00CV1729. On behalf of Federal Energy Sales, Inc. Testimony related to damages in disputed electric energy trading transactions.

128-Federal Energy Regulatory Commission. Docket Number ER01-2076-000. Testimony on behalf of Aquila Energy Marketing Corp and

Edison Mission Marketing and Trading, Inc. relating to the implementation of an Automated Mitigation Procedure by the New York ISO.

2000

127-New York Independent System Operator Board. Statement on behalf of Hydro Quebec, U.S. regarding the implications and impacts of the imposition of a price cap on an operating market system.

126-Federal Energy Regulatory Administration. Docket No. EL00-24-000. Testimony on behalf of Dayton Power and Light Company regarding the proper characterization and computation of regulation and imbalance charges.

125-American Arbitration Association File 71-198-00309-99. Report on behalf of Orange and Rockland Utilities, Inc. regarding the estimation of damages associated with the termination of a power marketing agreement.

124-Circuit Court, 15th Judicial Circuit, Palm Beach County, Florida. On behalf of Okeelanta and Osceola Power Limited Partnerships et. al. Analyses related to commercial operation provisions of a power purchase agreement.

1999

123-Federal Energy Regulatory Commission. Docket No. ER00-1-000. Testimony on behalf of TransEnergie U.S. related to market power associated with merchant transmission facilities. Also related analyses regarding market based tariff design for merchant transmission facilities.

122-Federal Energy Regulatory Commission. Docket RM99-2-000. Analyses on behalf of Edison Mission Energy relating to the Regional Transmission Organization Notice of Proposed Rulemaking.

121-Federal Energy Regulatory Commission. Docket No. ER99-3508-000. On behalf of PG&E Energy Trading, analyses associated with the proposed implementation and cutover plan for the New York Independent System Operator.

120-Federal Energy Regulatory Commission. Docket No. EL99-46-000. Comments on behalf of the Electric Power Supply Association relating to the Capacity Benefit Margin.

119-New York Public Service Commission, Case 97-F-1563. Testimony on behalf of Athens Generating Company describing the impacts on pricing and transmission of a new generation facility within the New York Power Pool under the new proposed ISO tariff.

118-JAMS Arbitration Case No. 1220019318 On behalf of Fellows Generation Company. Testimony related to the development of the independent power and qualifying facility industry and related industry practices with respect to transactions between cogeneration facilities and thermal hosts.

117-Court of Common Pleas, Philadelphia County, Pennsylvania. Analyses on behalf of Chase Manhattan Bank and Grays Ferry Cogeneration Partnership related to power purchase agreements and electric utility restructuring.

1998

116-Virginia State Corporation Commission. Case No. PUE 980463. Testimony on behalf of Appomattax Cogeneration related to the proper implementation of avoided cost methodology.

115-Virginia State Corporation Commission. Case No. PUE980462 Testimony on behalf of Virginia Independent Power Producers related to an applicaton for a certificate for new generation facilities.

114-Federal Energy Regulatory Commission. Analyses related to a number of dockets reflecting amendments to the PJM ISO tariff and Reliability Assurance Agreement.

113-U.S. District Court, Western Oklahoma. CIV96-1595-L. Testimony related to anti-competitive elements of utility rate design and promotional actions.

112-Federal Energy Regulatory Commission Dockets No. EL94-45-001 and QF88-84-006. Analyses related to historic measurement of spot prices for as available energy.

111-Circuit Court, Fourth Judicial Circuit, Duval County, Florida. Analyses related to the proper implementation of a power purchase agreement and associated calculations of capacity payments. (Testimony 1999)

1997

110-United States District Court for the Eastern District of Virginia, CA No. 3:97CV 231. Analyses of the business and market behavior of Virginia Power with respect to the implementation of wholesale electric power purchase agreements.

109-United States District Court, Southern District of Florida, Case No. 96-594-CIV, Analyses related to anti-competitive practices by an electric utility and related contract matters regarding the appropriate calculation of energy payments.

108-Virginia State Corporation Commission. Case No. PUE960296. Testimony related to the restructuring proposal of Virginia Power and associated stranded cost issues.

107-Federal Energy Regulatory Commission. Dockets No. ER97-1523-000 and OA97-470-000, Analyses related to the restructuring of the New York Power Pool and the implementation of locational marginal cost pricing.

106-Federal Energy Regulatory Commission Dockets No. OA97-261-000 and ER97-1082-000 Analyses and testimony related to the restructuring of the PJM Power Pool and the implementation of locational marginal cost pricing.

105-Missouri Public Service Commission. Case No. ET-97-113. Testimony related to the proper definition and rate design for standby, supplemental and maintenance service for Qualifying facilities.

104-American Arbitration Association. Case 79 Y 199 00070 95. Testimony and analyses related to the proper conditions necessary for the curtailment of Qualifying Facilities and the associated calculations of negative avoided costs.

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