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

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Panda Stonewall LLC	)	ER17-1821-002
	)	

PREPARED DIRECT TESTIMONY OF
JOSEPH E. BOWRING
ON BEHALF OF THE
INDEPENDENT MARKET MONITOR FOR PJM

**SUMMARY OF DIRECT TESTIMONY OF
JOSEPH E. BOWRING ON BEHALF OF
THE INDEPENDENT MARKET MONITOR FOR PJM**

The purpose of my testimony in this case is to explain that Panda Stonewall has the ability to recover a substantial portion of what Panda characterizes as its cost of reactive capability through the PJM competitive wholesale power markets and that Panda's compensation in this case should be limited to a maximum of $2,199 per MW-year as a result.

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PREPARED DIRECT TESTIMONY OF JOSEPH E. BOWRING
ON BEHALF OF THE INDEPENDENT MARKET MONITOR FOR PJM

1 **Q 1.   PLEASE STATE YOUR NAME AND POSITION.**

2   A.   My name is Joseph E. Bowring. I am the Market Monitor for PJM. I am the
3   President of Monitoring Analytics, LLC. My business address is 2621 Van Buren
4   Avenue, Suite 160, Eagleville, Pennsylvania. Monitoring Analytics serves as the
5   Independent Market Monitor for PJM, also known as the Market Monitoring Unit
6   (Market Monitor). Since March 8, 1999, I have been responsible for all the market
7   monitoring activities of PJM, first as the head of the internal PJM Market
8   Monitoring Unit and, since August 1, 2008, as President of Monitoring Analytics.
9   The market monitoring activities of PJM are defined in the PJM Market
10   Monitoring Plan, Attachment M and Attachment M-Appendix to PJM Open
11   Access Transmission Tariff (OATT).[1]

12 **Q 2.   WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

13   A.   Panda Stonewall is requesting nonmarket compensation from customers for
14   reactive services in this case. Panda Stonewall is requesting $5,470,679 per year in
15   compensation, which equals $7,032 per MW-year using a unit size of 778 MW.[2]

16   The purpose of my testimony in this case is to explain that Panda Stonewall has
17   the ability to recover a substantial portion of what Panda characterizes as its cost

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[1]   *See PJM Interconnection, L.L.C.*, 86 FERC ¶ 61,247; 18 CFR § 35.34(k)(6).

[2]   *See* Exhibit PS-040 at 67:16–68:1. The MW size of 778 MW based on publicly
       available information which can be accessed at:
       <http://www.pandafunds.com/invest/stonewall/>.

1   of reactive capability through the PJM competitive wholesale power markets and

2   that Panda's compensation in this case should be limited to a maximum of $2,199

3   per MW-year as a result.

4 **Q 3.**   **HAVE YOU PROVIDED TESTIMONY ON COMPENSATION FOR**

5   **REACTIVE POWER IN OTHER PROCEEDINGS BEFORE THE FERC?**

6 A.   Yes, I was invited to participate in a Commission technical conference and

7   provided testimony to the Commission in a proceeding convened to "discuss

8   compensation for Reactive Supply and Voltage Control (Reactive Supply) within

9   the Regional Transmission Organizations (RTOs) and Independent System

10   Operators (ISOs)."[3] Specifically, the proceeding explored "types of costs incurred

11   by generators for providing Reactive Supply capability and service; whether those

12   costs are being recovered solely as compensation for Reactive Supply or whether

13   recovery is also through compensation for other services; and different methods by

14   which generators receive compensation for Reactive Supply (e.g., Commission-

15   approved revenue requirements, market-wide rates, etc.)."[4]

16   The Market Monitor has intervened in and actively participated in more than 50

17   FERC proceedings concerning reactive power during the past two years. The

18   Market Monitor includes analysis and recommendations related to reactive power

19   in the State of the Market Reports for PJM.[5]

20 **Q 4.**   **IS PANDA'S REQUEST FOR A NONMARKET PAYMENT IN THIS CASE**

21   **FOR REACTIVE CAPABILITY FOR THE PANDA STONEWALL**

22   **FACILITY REASONABLE?**

23 A.   No. Panda is requesting a nonmarket payment of $7,032 per MW-year based on a

24   unit size of 778 MW. But Panda does not account for the fact that the PJM market

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[3]   *Reactive Supply Compensation in Markets Operated by Regional Transmission Organizations and Independent System Operators*, Docket No. AD16-17-000. I participated in a workshop convened June 20, 2016. The Market Monitor filed comments on July 29, 2016, and reply comments on September 20, 2016.

[4]   *Id.* at 1.

[5]   See *State of the Market Report for PJM*, which can be accessed at: <*http://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2018.shtml*>.

1 provides the facility the opportunity to recover its reactive capability costs in
2 excess of $2,199 per MW-year, which is the credit for reactive revenues identified
3 in the PJM tariff.[6]

4 **Q 5.** **HOW DO PJM MARKET RULES PROVIDE THE OPPORTUNITY TO**
5 **RECOVER REACTIVE CAPABILITY COSTS?**

6 A. PJM market rules provide for the opportunity to recover the costs of reactive
7 power capability in two ways: through the definition of the demand curve for
8 capacity and through the default market seller offer cap. This is exactly the same
9 way that PJM market rules provide for the opportunity to recover all the costs of
10 capacity resources.

11 One of the key parameters of the demand curve for capacity, the Variable
12 Resource Requirement (VRR) curve, is the net cost of new entry or net CONE.
13 Net CONE affects the location and shape of the demand curve for capacity and
14 thus the clearing price for capacity. Net CONE equals the gross cost of new entry
15 for the reference unit technology less the revenues from energy and ancillary
16 services revenues that offset that cost. The energy market revenues are calculated
17 based on the dispatch of the reference unit against historical locational marginal
18 price (LMPs) for the last three years and the revenues for ancillary services
19 (reactive only) are included in the tariff as a fixed number, $2,199 per MW-year.

20 **Q 6.** **HOW DO YOU KNOW THAT THE $2,199 PER MW-YEAR INCLUDES**
21 **ONLY REACTIVE REVENUES?**

22 A. I have direct knowledge of the calculation. Under my supervision, the $2,199 per
23 MW-Year value was calculated by the Market Monitor staff for inclusion in the
24 PJM OATT.[7]

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6 *See* OATT Attachment DD § 5.10(a)(v)(A).

7 *See PJM Interconnection, L.L.C.*, 126 FERC ¶ 61,275 (2009) at P 40 ("Net CONE
   consists of Gross CONE minus an offset for energy and ancillary services
   revenues. PJM states that it currently estimates those revenues based on the
   average energy and ancillary services revenues that would have been received by
   the Reference Resource for the three most recent calendar years, plus an estimate
   of reactive service revenues."); PJM Filing, Docket No. ER09-419-000 (Dec. 12,

1 **Q 7.**   **HOW DOES THE $2,199 PER MW-YEAR NUMBER AFFECT THE**
2   **DEMAND CURVE FOR CAPACITY?**

3 A.   Elimination of the ancillary services revenue offset of $2,199 per MW-year would
4   mean that the prices on the VRR curve for each MW level would be higher and the
5   clearing prices for capacity that result from the interaction of the supply curve and
6   the VRR curve, would be higher. The result would be the recovery of additional
7   reactive capacity revenues in the price of capacity for all resources.

8   For example, the RTO VRR curve in the 2021/2022 Base Residual Auction (BRA)
9   had a maximum price of $482.36 per MW-day, which was 1.5 times net CONE. If
10   the reactive offset of $2,199 per MW-day had been eliminated, net CONE would
11   have increased to $327.97 per MW-day and the maximum price on the RTO VRR
12   curve would have been $491.96 per MW-day.

13 **Q 8.**   **WHY IS THE DEMAND CURVE RELEVANT?**

14 A.   If there were no nonmarket recovery of reactive revenue, there would be no
15   reactive revenue offset to net CONE and the demand curve would result in higher
16   capacity market prices, all else held constant. If there were no nonmarket recovery
17   of reactive revenue, the shape and location of the demand curve would give unit
18   owners the opportunity to recover all reactive capability costs in the capacity
19   market.

20   This is how the capacity market works for all the other costs of a generating plant
21   other than short run marginal costs.

22 **Q 9.**   **HOW DOES THE $2,199 PER MW-YEAR NUMBER AFFECT MARKET**
23   **SELLER OFFER CAPS?**

24 A.   The default market seller offer cap under the capacity performance rules in the
25   PJM Capacity Market is defined as net CONE times B, where B is the balancing
26   ratio. The balancing ratios used in the PJM market have ranged from .785 to .850.

2008) at 18 n.34 ("This figure is the average annual reactive revenue for
combustion turbines from 2005 through 2007, based on the actual costs reported to
the Commission in reactive service filings of CTs, as developed by the IMM.").

1   The result of using a $2,199 per MW-year offset is that energy and ancillary
2   service revenues are higher and therefore the offer cap is lower. If the $2,199 per
3   MW-year offset were eliminated, net revenues would be lower, net CONE would
4   be higher and the offer cap would be higher. The offer cap would be higher by
5    $2,199 per MW-year times the balancing ratio. Using the balancing ratio from the
6   2021/2022 BRA of .785, the offer cap would be higher by $4.73 per MW-day, or
7   1.86 to 2.99 percent, depending on the market seller offer caps by zone for the
8   2021/2022 delivery year.

9 **Q 10.   WHY ARE MARKET SELLER OFFER CAPS RELEVANT?**

10   A.   If there were no nonmarket recovery of reactive revenue, there would be no
11   reactive revenue offset to net CONE and the default market seller offer cap would
12   be higher. Unit owners could increase their offers to recover reactive capability
13   costs if they believed that the offer would be competitive. If there were no
14   nonmarket recovery of reactive revenue, the higher offer cap would give unit
15   owners the opportunity to recover all reactive capability costs in the capacity
16   market.

17   This is how the capacity market works for all the other costs of a generating plant
18   other than short run marginal costs.

19 **Q 11.   WHAT IS THE IMPACT OF A COST OF SERVICE RATE IN THE PJM**
20   **MARKET WITH A DEFINED ANCILLARY REVENUE OFFSET?**

21   A.   If there were no ancillary services revenue offset, reactive costs would be entirely
22   addressed in the PJM Capacity Market. Unit owners would have the ability to
23   offer capacity at prices up to and including the offer cap and to make a
24   competitive offer including all the relevant costs of generation.

25   If there were no ancillary services revenue offset, the shape and location of the
26   VRR curve would give unit owners the opportunity to recover reactive capability
27   costs in the capacity market.

28   Given that there is a defined ancillary services revenue offset, reactive costs above
29         $2,199 per MW-year are entirely addressed in the PJM Capacity Market. Unit
30   owners have the opportunity to recover the revenue requirement for all reactive
31   capability costs greater than $2,199 per MW-year in the capacity market.

1   Any request for unit specific cost of service reactive revenue requirements under
2   Schedule 2 in excess of $2,199 per MW-year is a request for double recovery of
3   reactive costs.

4 **Q 12.   COULD THE CAPACITY MARKET WORK FOR REACTIVE WITHOUT**
5   **A COST OF SERVICE RATE?**

6   A.   Yes. The market design could work if the $2,199 per MW-year ancillary revenue
7   offset were eliminated from the calculation of net CONE. The result would be a
8   market based approach rather than a hybrid market/nonmarket approach in which
9   unit owners recover up to $2,199 per MW-year in cost of service rates and the
10 balance through the market.

11 Under the current capacity market rules, the gross costs of the entire plant,
12 including any reactive related costs, are included in the gross CONE and the
13 nonmarket revenues from reactive service capability cost of service rates are an
14 offset to the gross CONE. Under this approach there is a separate collection of
15 reactive capability costs through a nonmarket mechanism.

16 An alternative, market based approach to the current treatment of reactive costs in
17 the capacity market would be to continue to include the gross costs of the entire
18 plant including any reactive related costs in the gross CONE and to calculate net
19 CONE without a reactive revenue offset for reactive service capability rates.
20 Under this approach there would be no separate nonmarket collection of reactive
21 capability costs through cost of service filings like Panda's filing in this docket.

22 The market based approach relies on competitive markets to provide incentives to
23 provide power, both real and reactive, at the lowest possible cost. The market
24 based approach does not require the use of arbitrary, approximate and generally
25 inaccurate allocators to determine the cost of providing reactive. The market based
26 approach does not require the use of estimated, average and inaccurate reactive
27 revenue offsets to calculate net CONE.

28 Units are compensated for reactive capability costs under the market based
29 approach. But the compensation is based on the outcome of a competitive capacity
30 market rather than guaranteed based on current or historical cost of service filings.

1 **Q 13. WHY IS RELIANCE ON MARKETS TO RECOVER SOME OR ALL OF**
2 **THE COSTS OF INVESTMENT IN REACTIVE CAPABILITY BETTER**
3 **PUBLIC POLICY?**

4 A. PJM operates a wholesale power market. The Commission decided to rely on
5 competitive markets as a more effective and efficient substitute for cost of service
6 regulation.[8] One of the few exceptions to relying on markets for all elements of
7 operating the wholesale power market is the treatment of reactive power. It has
8 been asserted that reactive power requires cost of service rates because markets for
9 reactive are small and local.[9] This ignores the fact that every unit in PJM has the
10 capability to provide reactive and is required to have the capability to provide
11 reactive. As a result, the market for reactive capability includes the entire PJM
12 market. The local part is the actual provision of reactive service. PJM addresses

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8 *See Promoting Wholesale Competition Through Open Access Non-Discriminatory
Transmission Services by Public Utilities; Recovery of Stranded Costs by Public
Utilities and Transmitting Utilities*, Order No. 888, FERC Stats. & Regs. ¶ 31,036,
mimeo at 3 (1996) ("The continuing competitive changes in the industry and the
prospect of these benefits to customers make it imperative that this Commission
take the necessary steps within its jurisdiction to ensure that all wholesale buyers
and sellers of electric energy can obtain non-discriminatory transmission access,
that the transition to competition is orderly and fair, and that the integrity and
reliability of our electricity infrastructure is maintained."), *order on reh'g*, Order
No. 888-A, FERC Stats. & Regs. ¶ 31,048, *order on reh'g*, Order No. 888-B, 81
FERC ¶ 61,248 (1997), *order on reh'g*, Order No. 888-C, 82 FERC ¶ 61,046
(1998), *aff'd in relevant part sub nom. Transmission Access Policy Study Group v.
FERC*, 225 F.3d 667 (D.C. Cir. 2000), *aff'd sub nom. New York v. FERC*, 535
U.S. 1 (2002); *Regional Transmission Organizations*, Order No. 2000, FERC
Stats. & Regs.¶ 31,089 *mimeo* at 115 (1999) ("Based on the record before us with
respect to undue discrimination and market power, as well as with respect to
economic and engineering issues affecting reliability, operational efficiency, and
competition in the electric industry, it is clear that RTOs are needed to resolve
impediments to fully competitive markets."), *order on reh'g*, Order No. 2000-A,
FERC Stats. & Regs. ¶ 31,092 (2000), *aff'd sub nom. Pub. Util. Dist. No. 1 of
Snohomish County, Washington v. FERC*, 272 F.3d 607 (D.C. Cir. 2001).

9 Sotkiewicz Direct Testimony at 4:9–14.

1   the local need for reactive by making direct payments to units than incur
2   opportunity costs when requested to produce reactive by PJM.[10]

3   The continued nonmarket approach to providing reactive is anachronistic and
4   inconsistent with the PJM market design and should be eliminated.

5   In addition, cost of service ratemaking creates unnecessary monitoring difficulties.
6   Because service providers do not have to file rates periodically, suppliers have no
7   incentive to adjust reactive capability rates except when they increase. Suppliers
8   have direct access to information about the costs for their own units; the
9   Commission and other parties do not have such access. When rates are established
10   on a fleet basis or result from a black box settlement, the ability of parties to
11   review and challenge rates is further reduced. Arguments about the power factor to
12   use in the allocation of costs to reactive are an example. PJM requires a 0.90
13   lagging power factor at economic maximum output. Units assert that they can,
14   under defined test conditions, produce reactive at a 0.85 or lower power factor.
15   There are questions about test conditions and what the results of the tests actually
16   mean.

17   Arguments about what the AEP method really means are another example. Unit
18   owners have the incentive to support the AEP method, which is just a cost of
19   service approach, and to selectively expand the AEP method to include additional
20   costs.

21   Rather than relying on markets, complex arguments are advanced about which
22   power factor to use. Unit owners have an incentive to maximize the measurement
23   of reactive costs because reactive revenues are a guaranteed source of revenue
24   each year, immune from competitive market forces.

25 **Q 14.**   **DOES THIS CONCLUDE YOUR TESTIMONY?**

26   A.   Yes.

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[10]   *See* PJM Operating Agreement Schedule 1 § 3.2.3B.

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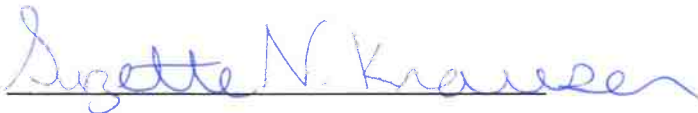   )

AFFIDAVIT

JOSEPH E. BOWRING being duly sworn deposes and states that I prepared the testimony to which this affidavit is attached with the assistance of the staff of Monitoring Analytics, LLC, and that the statements contained therein are true and correct to the best of my knowledge and belief. Monitoring Analytics, LLC is acting in its capacity as the Independent Market Monitor for PJM.
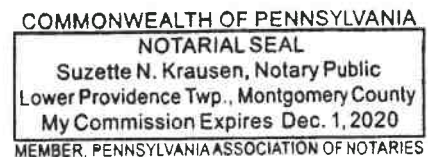
Joseph Bowring

Joseph E. Bowring

Sworn to and subscribed before me this 4[h] day of October, 2018

Suzette N. Krausen

Notary Public

COMMONWEALTH OF PENNSYLVANIA
NOTARIAL SEAL
Suzette N. Krausen, Notary Public
Lower Providence Twp., Montgomery County
My Commission Expires Dec. 1, 2020
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

My Commission expires: December 1, 2020