PUBLIC

BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Application Seeking Approval of Ohio Power Company's Proposal to Enter into an Affiliate Power Purchase Agreement for Inclusion in the Power Purchase Agreement Rider.	)))))	Case No. 14-1693-EL-RDR
In the Matter of the Application of Ohio Power Company for Approval of Certain Accounting Authority.	)))	Case No. 14-1694-EL-RDR

DIRECT TESTIMONY OF A. JOSEPH CAVICCHI
ON BEHALF OF THE PJM POWER PROVIDERS GROUP
AND
THE ELECTRIC POWER SUPPLY ASSOCIATION

September 11, 2015

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I. Introduction, Purpose of Testimony, and Summary of Conclusions

Q1. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.

A1. My name is A. Joseph Cavicchi. My business address is 200 State Street, Boston, MA 02109.

Q2. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?

A2. I am employed by Compass Lexecon as an Executive Vice President.

Q3. PLEASE BRIEFLY DESCRIBE THE SERVICES PROVIDED BY COMPASS LEXECON.

A3. Compass Lexecon is an economics and financial consulting firm that provides corporations, law firms, and government agencies with analysis of complex economic and financial issues for use in legal and regulatory proceedings, and in strategic decision-making. Compass Lexecon is actively involved in a wide variety of matters that can arise in the areas of economics and finance. Our practice areas include energy and environmental economics, antitrust, securities, damages, intellectual property, as well as business consulting and public policy analysis.

Q4. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A4. I hold Masters Degrees in Technology and Policy and in Environmental Engineering from the Massachusetts Institute of Technology and Tufts University, respectively. I provide economic analysis and expert testimony in various state and federal regulatory proceedings related to electricity markets. In particular, I work with clients on a variety of state regulatory and Federal Energy Regulatory Commission ("FERC") proceedings,

and often file testimony and affidavits supported by economic analyses. I have filed testimony in numerous state and FERC proceedings and I have worked extensively on U.S. wholesale electricity markets. Throughout my career, I have been directly involved with corporations, private and public institutions, and state and federal regulatory authorities in connection with the economics of the electricity industry. For the past 18 years, I have worked almost exclusively on the regulatory economics of the electricity industry, and, in particular, performing economic analyses of wholesale electricity markets. Additional detail regarding my credentials and experience can be found in my curriculum vitae, which is provided as Attachment AJC-5.

Q5. ON WHOSE BEHALF ARE YOU PRESENTING TESTIMONY?

A5. I am presenting testimony on behalf of the PJM Power Providers Group ("P3") and the Electric Power Supply Association ("EPSA").

Q6. PLEASE DESCRIBE P3 AND EPSA.

A6. P3 is a non-profit organization dedicated to advancing federal, state and regional policies which promote properly designed and well-functioning electricity markets in the PJM Interconnection, L.L.C. ("PJM") region. P3 membership is comprised of energy providers that are members of PJM, conduct business in the PJM balancing authority area, and are signatories to various PJM agreements. Combined, the P3 members own over 87,000 megawatts of generation assets and over 51,000 miles of transmission lines in the PJM region, serve nearly 12.2 million customers and employ over 55,000 people in the PJM region, representing 13 states and the District of Columbia. My testimony does not necessarily reflect the specific views of any particular member of P3 with respect to any issue.

EPSA is a national trade association representing competitive power generators and suppliers. EPSA members own or operate nearly 40% of all the installed generation capacity in the United States, and provide reliable and competitively priced electricity from environmentally responsible facilities. Many of EPSA's members own or operate facilities in Ohio and are market participants in PJM. EPSA seeks to bring the benefits of competitive generation to all power customers. My testimony represents the position of EPSA as an organization, but not necessarily the views of any particular member with respect to any issue.

Q7. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A7. I have been asked by P3 and EPSA to review and analyze the Application for the power purchase agreement ("PPA") Rider ("PPA Proposal") in this matter and whether the proposal would stabilize retail rates and provide a financial hedge for the Ohio Power Company ("AEP Ohio" or the "Company") retail customers.[1]

Q8. PLEASE DESCRIBE AEP OHIO'S PPA PROPOSAL.

A8. AEP Ohio has proposed to enter into a PPA with its affiliate AEP Generation Resources ("AEP Genco"). The PPA Proposal envisions that AEP Ohio purchases the rights to a total of approximately 3,100 MW of generation output from (a) nine generation units that are either wholly or jointly owned by AEP Genco and (b) AEP Ohio's holdings in Ohio

[1] In association with my review I cite herein the Direct Testimonies of William A. Allen, Pablo A. Vegas, Kelly D. Pearce, Steven M. Fetter, and Toby L. Thomas in Support of AEP Ohio's Amended Application, *In the Matter of the Application Seeking Approval of Ohio Power Company's Proposal to Enter into an Affiliate Power Purchase Agreement for Inclusion in the Power Purchase Agreement Rider, In the Matter of the Application of Ohio Power Company for Approval of Certain Accounting Authority*, Case Nos. 14-1693-EL-RDR and 14-1694-EL-AAM, May 15, 2015.

Valley Electric Company ("OVEC").[2] Under the PPA Proposal, AEP Ohio would pay AEP Genco all historical and going forward costs associated with the generating units as if the generating units were regulated under a cost of service framework (i.e., AEP Genco recovers all operating costs associated with the units including a return on and of capital invested in the units both historically and in the future). The power products (energy, capacity, and ancillary services) produced by these generating units would be sold into PJM's wholesale markets and the revenues received for the sales would be credited against the costs and AEP Ohio ratepayers would either pay (when revenues are less than costs) or be paid (when revenues are greater than costs) the difference. The PPA Proposal provides AEP Genco with guaranteed cost recovery and return on investment while AEP Ohio ratepayers accept all the risks associated with taking on ownership of merchant generation resources.

Q9. WHAT IS THE KEY BENEFIT FOR THE RETAIL CUSTOMER THAT AEP OHIO IDENTIFIES IN ASSOCIATION WITH ITS PPA PROPOSAL?

A9. AEP Ohio claims that its PPA proposal "will benefit AEP Ohio's customers at the outset by providing an 'insurance policy' to hedge against price spikes caused by market volatility."[3] AEP Ohio goes on further to claim that its proposal provides insurance as it represents "a small payment upfront guard[ing] against larger (potentially difficult to pay) costs later."[4] In addition, throughout the Company's witnesses' testimonies there is reference to the Winter 2014 extreme cold weather and an indication that the PPA Rider

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2 Three of the nine units, totaling 1,400 MW of capacity, are wholly owned by AEP Genco (See Thomas Direct Testimony at 3:5). Note that in the case of the OVEC generation, OVEC invoices AEP Ohio its share of the costs associated with its rights to the generation output; this generation is not subject to the proposed PPA.

3 Vegas Direct Testimony at 7:3-4.

4 Fetter Direct Testimony at 9:23-10:1.

would protect retail customers against the market price volatility associated with these sorts of transient events that result in wholesale spot-market price volatility.[5]

Q10. IS THERE ANY EVIDENCE THAT AEP OHIO'S PROPOSAL WILL DELIVER THESE AFOREMENTIONED CLAIMED BENEFITS?

A10. No. In fact, empirical evidence shows that retail price volatility would not be materially different in the presence of the rider. Moreover, the idea that the PPA Proposal serves as a form of insurance is incorrect and clearly contrary to the basic economic principles underlying insurance.

First, AEP Ohio's retail customers already enjoy the benefits of low volatility Standard Service Offer ("SSO") and Competitive Retail Electric Service ("CRES") provider electricity commodity prices. These retail electricity commodity prices (primarily based on so-called fixed-price, full-requirements power supply agreements) lock in customer pricing months and years ahead of actual power delivery using low volatility forward/futures wholesale electric energy market pricing. The infrequent addition (depending upon the timing of PPA rider reconciliation) of an additional cost or credit under the PPA Proposal will simply move rates up or down compared to the level they would have otherwise have been set at absent the PPA Proposal. The current retail rates are not directly linked to the much more volatile wholesale market spot prices.

Next, AEP Ohio's PPA Proposal is not an insurance policy against future cost increases. When an entity takes out an insurance policy, the costs under the policy are fixed upfront in exchange for protection against what is typically expected to be a low probability event

[5] Vegas Direct Testimony at 8:10-11, Pearce Direct Testimony at 18:7-9, and Fetter Direct Testimony at 7:21-22.

(e.g., fire, flood, storm etc.). Under AEP Ohio's PPA proposal the cost is unknown and AEP Ohio offers nothing more than an estimate that the ultimate "payment" by retail customers will be small and the long-term financial benefits to retail customers positive. Moreover, the costs of the PPA proposal could rise unexpectedly over time. For example, under the PPA proposal AEP's Genco has a clear incentive to keep the generating units operating as long as possible regardless of their age in order to earn the guaranteed minimum 8.9% return on equity.[6] Imagine if a large generating unit, like Cardinal, experiences a costly equipment failure. The so-called insurance "premium" could rise long after the "policy" has been issued, and furthermore, the insurance provider will plainly be incentivized to increase costs. AEP Ohio's PPA Proposal is not an insurance policy.

AEP Ohio's PPA Proposal represents nothing more than a *bet* that future PJM wholesale power prices will be sufficiently high over the long run to offset the purported fully embedded costs of the generating units. These costs, calculated by AEP's Genco assuming a utility cost-of-service rate-making framework, are not the costs that AEP's Genco is actually incurring to keep the generating units operational. [redacted] The proposed PPA seeks to recover AEP Genco costs that competitive market revenues may or may not cover in the future. The AEP Ohio PPA Proposal offers no guarantee whatsoever that a ratepayer backed agreement to bear these costs until the generating units retires is beneficial for AEP Ohio ratepayers.

[6] See IEU RPD-1-002 Supplemental Attachment 1 at page 11 of 32.

Finally, it is critical to recognize that the costs that AEP Ohio will incur under its PPA Proposal include AEP Genco generating unit legacy capital investments ("sunk costs") that have no bearing on whether the generating units will remain operational in the years ahead. If PJM power prices achieve those levels projected by AEP Ohio in its PPA Proposal, AEP's Genco would earn far more revenue than necessary to cover its projected going forward costs (i.e., fixed operation and maintenance costs and incremental capital costs) without the PPA. Based on the evidence provided to support the PPA rider proposal, there is no material concern regarding the ongoing operation of the generating units associated with the PPA Proposal.

Q11. WILL AEP OHIO'S PPA PROPOSAL ALSO DISTORT THE INCENTIVES FACED BY AEP GENCO WHEN OPERATING THE GENERATING UNITS?

A11. Yes. The guaranteed return of all costs including a return on equity will create incentives for AEP Genco to sustain inefficient operations (i.e., operations and investment that would not be economic under PJM's market-determined prices). Under the PPA Proposal AEP Genco, would basically be allowed to pass through all costs (including a guaranteed return) associated with the generating units resulting in AEP Ohio ratepayers bearing the risks otherwise borne by AEP Genco. The results of subsidizing these risks is that AEP Genco would rationally seek to make capital investments in the plants to support continued operations, even when such investments are uneconomic relative to alternatives in the open marketplace. The costs of creating incentives to make uneconomic and distorted investment decisions will be borne by AEP Ohio's ratepayers.

These incentives will be aligned exactly with those of generating plant owners facing traditional cost-of-service, rate-of-return regulation. Public policy economics recognizes

that rate-of-return regulation, an important regulatory tool when companies display the characteristics of natural monopoly, distorts owners' incentives in ways that drive up costs to ratepayers.[7] In addition, the PPA Proposal gives AEP Genco limited incentives to operate efficiently.[8] In contrast, other generation owners in PJM's wholesale markets are under constant pressure to minimize the costs of operation and make optimal investment decisions.

Q12. WHO BENEFITS FROM THE PPA PROPOSAL?

A12. The only clear beneficiary of AEP's PPA Proposal is AEP Genco. As AEP Genco witness Mr. Thomas testifies, the PPA Proposal, if adopted, provides AEP Genco with the certainty that these generation units will earn over at least the next 15-23 years a generous return on and of capital investment regardless of whether the PPA assets are operationally efficient. In fact, the PPA Proposal is a hedge for AEP's Genco as it ensures that these generating units recover all operational costs plus a guaranteed return of and on capital. The PPA Proposal effectively transfers the ownership of these generation units to AEP Ohio ratepayers. AEP's Genco shields itself from all the risks associated with owning and operating the units and transfers those risks at an unknown cost to retail ratepayers.

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[7] "Rate-of-return regulation gives the firm incentives to misreport cost allocations, choose an inefficient technology (in some cases), undertake cost-reducing innovation in an inefficient way, underproduce in a noncore market, price below marginal cost in a competitive market which happens to be included in the set of core markets regulated by an aggregate rate-of-return constraint, and view diversification decisions inefficiently." Braeutigam, R. R., & Panzar, J. C. (1989), "Diversification Incentives under 'Price-Based' and 'Cost-Based' Regulation," *The RAND Journal of Economics*, 373-391.

[8] The proposed PPA does not provide the seller with a clear incentive to maintain high generating unit availability as when units are on outage the seller is not penalized. Moreover, the capacity pricing is not conditioned upon unit availability, which is unusual (See IEU RPD-1-002 Supplemental Attachment 1 at Article 3.9 and V). Typically an agreement like the proposed PPA ties capacity payments to unit availability and financially penalizes the seller for poor generating unit availability.

Q13. PLEASE SUMMARIZE YOUR CONCLUSIONS AND RECOMMENDATIONS FOR THIS INITIAL SECTION OF YOUR TESTIMONY?

A13. I conclude that AEP Ohio's PPA Proposal does not provide retail ratepayers sufficient benefits to outweigh the risks taken on by AEP Ohio customers under the PPA Proposal and I recommend that AEP Ohio's PPA Proposal be rejected. The Public Utilities Commission of Ohio ("Commission") has indicated that a proposal like that of AEP Ohio, which supplements the benefits of staggering and laddering of SSO auctions, and provides for a significant financial hedge that truly stabilizes rates, may be appropriate.[9] However, the AEP Ohio PPA Proposal cannot guarantee that retail customer rates will be more stable than they would be without the PPA Proposal. Moreover, the nature of AEP Ohio's 15-23 year term PPA Proposal, offering no fixed cost guarantees whatsoever (i.e., its "price" is unknown and will fluctuate), does not provide a significant financial hedge for customers. I conclude that the AEP Ohio PPA Proposal does not fulfill the Commission's objectives and simply forces the undiversified risk of ownership of 3,100 MW of merchant coal-fired generation resources upon retail ratepayers.

II. Impact of the PPA Proposal on Retail Price Volatility and Rates

Q14. WHAT TYPES OF POWER SUPPLY PRODUCTS ARE AVAILABLE TO AEP OHIO'S RETAIL CUSTOMERS?

A14. AEP Ohio's retail customers can elect to buy power supply from AEP Ohio at its SSO rate or from a number of CRES providers, who offer a variety of different pricing structures.

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[9] See Ohio Power Company d/b/a AEP Ohio, *In re Ohio Power Co.*, Case No. 13-2385-EL-SSO, et al., Opinion and Order (February 25, 2015), at 25.

The majority of the customers who elect the SSO are residential and smaller commercial customers.[10] These smaller customers' SSO rates are currently established through wholesale power supply procurement auctions carried out by AEP Ohio twice per year. In these auctions AEP Ohio solicits one-, two- and three-year term fixed-price, full-requirements power supply products where it pays power suppliers fixed prices based on product type and term.[11] AEP Ohio sets its SSO rate based on the fixed prices paid for power under these contracts.

CRES providers offer a variety of power supply products that AEP Ohio customers can chose as an alternative to the SSO rate. For example, the Commission compiles the various retail power supply offers available from CRES providers.[12] There are currently 27 power suppliers on the Apples-to-Apples list who are offering AEP Ohio retail customers a variety of different power supply options. A large majority (85%) of power supply products offer consumers fixed prices over a variety of different terms extending up to three years. For example, currently posted data shows that there are 56 CRES provider offers for fixed-price power supply products with a term of a year or more. Of these, there are 16 unique fixed-price offers with a term of two years and five unique

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[10] The Public Utilities Commission of Ohio reports electric customer choice switch rates and the majority of larger AEP Ohio commercial and industrial customer load is reported as being served by CRES providers with remaining customers being those with lower loads on average. See, http://www.puco.ohio.gov/puco/index.cfm/industry-information/statistical-reports/electric-customer-choice-switch-rates-and-aggregation-activity/#sthash.GYJ7YvAi.OzxfeLet.dpbs, accessed September 6, 2015.

[11] AEP Ohio has recently procured an approximately equal mixture of three-year, two-year and one-year fixed-price power supply contracts to meet SSO obligations over the next three years (see reported AEP Ohio power supply auction results available at: http://www.aepohiocbp.com/index.cfm?s=background&p=previousResults and AEP Ohio auction schedule available at: http://www.aepohiocbp.com/index.cfm?s=calendar&p=calendar, accessed September 7, 2015).

[12] The Public Utilities Commission of Ohio reports Apples-to-Apples pricing comparisons where customers are able to review the various CRES provider offers available and compare them. See, http://www.energychoice.ohio.gov/ApplesToApplesComparision.aspx?Category=Electric&TerritoryId=2&RateCode=1, accessed September 7, 2015.

fixed-price offers with a term of three years. Although AEP Ohio's Mr. Allen suggests that CRES providers do not offer long-term stable prices,[13] current product offerings show a variety of stable pricing options available to AEP Ohio's retail customers.[14]

Q15. HOW DO RETAIL CUSTOMERS' POWER SUPPLY COSTS CHANGE UNDER THESE DIFFERENT POWER PRODUCT PRICING APPROACHES?

A15. Retail customer power costs change slowly over time incorporating the change in the pricing of the underlying wholesale power supply products relied upon by power sellers at the time prices are fixed. Whether a customer obtains SSO service from AEP Ohio, or fixed-price service from a CRES provider, the product pricing is established based on forward/futures market prices at the time when the power supply product is purchased.[15] The futures market prices that underlie these power supply products do not exhibit the volatility seen in wholesale power supply spot markets. Thus, as power supply contracts expire and get renewed, consumer pricing moves up and down slowly in response to changes in wholesale market prices and costs.

Q16. HAVE YOU DONE AN ANALYSIS OF ELECTRICITY PRICE VOLATILITY?

A16. Yes. Attachment AJC-1 compares the volatility of wholesale electric energy prices at PJM's AEP-Dayton hub for product durations of one day to one year. While price volatility is relatively high for daily electric energy supply, for longer-term energy supply the volatility of prices is much lower. Attachment AJC-1 shows that the annualized

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13 Allen Direct Testimony at 6:18-7:4.

14 Because AEP Ohio has just completed an auction process whereby all of the wholesale power supply needed to meet its future residential and small commercial SSO load has been obtained through fixed-price, full-requirements contracts (see above), it is likely that the completion of this transition has resulted in the greater number of CRES provider offers now being made to AEP Ohio customers.

15 CRES providers also offer retail customers variable rate products whose pricing will be based on shorter duration wholesale electric energy products.

volatility of daily on-peak energy prices at the AEP-Dayton hub is 274%, while the annualized volatility of one-year duration on-peak energy prices is only 18%. These results indicate that the volatility of one-year energy prices is only approximately 7% that of daily energy prices. Retail power price volatility is driven by these longer-term forward market energy prices, not week-to-week, day-to-day, or hour-to-hour spot-market prices.

Q17. WHAT IMPACT WILL THE COMPANY'S PPA PROPOSAL HAVE ON RETAIL CUSTOMER PRICING?

A17. The PPA proposal will have two impacts on retail customer rates. First, retail customers will pay more or less for their power supply depending upon whether the PPA Proposal generating units earn sufficient revenues in PJM's wholesale markets to cover the units' (including OVEC) fully embedded costs. Second, customers will be subject to a PPA rider reconciliation process where the difference between annual forecasted and actual revenues (or costs) under the PPA Proposal are passed through to customers.

Q18. HOW WILL THE PPA PROPOSAL IMPACT RETAIL PRICES?

A18. The Company's initial estimate of the impact of the PPA Proposal indicates that residential retail rates would increase $1.75/MWh, or 1.25%, assuming the currently reported residential customer price of $140/MWh.[16] The Company analyses project various annual costs or credits over the first 9 years of the up to 23-year PPA, most of which would only result in a modest charge or credit, depending upon generating unit

[16] Allen Direct Testimony at 13:11-12. Note also that Mr. Allen bases his estimate on the Direct Testimony of Mr. Pearce. However, Mr. Allen does not indicate which data he relies upon. I have assumed that he uses data from Exhibit KDP-2 to derive his estimate. See also AEP Ohio current rate entries at Ohio's Utility Rate Survey available at: http://www.puco.ohio.gov/puco/index.cfm/industry-information/statistical-reports/ohio-utility-rate-survey/sthash.D6DTZpmz.dpbs#sthash.PwDBEaCJ.dpbs.

costs and PJM wholesale market revenues.[17] Thus, the Company expects its retail customers' rates would be impacted modestly at most by the PPA rider.

The impact of revenue reconciliation under the PPA rider must also be taken into account. The Company proposes to base the PPA rider's rate on an annual forecast of revenues and costs under the PPA.[18] This means that, most likely a couple months ahead of updating the PPA rider, the Company will estimate the costs it expects to incur under the PPA and the projected generating unit wholesale market revenues for an upcoming year. As proposed, the Company will compare actual costs and revenues over the course of a year against projected costs and revenues, and the resulting difference will be charged or credited to customers during the following year. The administration of the reconciliation process means that customer rates will either be higher or lower depending upon how wholesale market revenues and generating unit costs change over the course of a year.[19]

The combination of these two different rate impacts will determine how the PPA Proposal impacts customer rates.

Q19. WILL THE RETAIL RATE IMPACT OF THE PPA PROPOSAL HAVE A MATERIAL IMPACT ON RETAIL PRICE STABILITY?

A19. No. Based on the analysis provided by the Company, and an estimate of the impact of the reconciliation process on the rate, the PPA Proposal practically will have no impact on retail rate stability. There are three reasons for this conclusion. First, as I explain above, the cost or credit under the PPA Proposal as estimated by the Company is

[17] See Pearce Direct Testimony, Exhibit KDP-2, average of high load and low load forecast including carbon dioxide tax. I assume AEP Ohio load is little over 41 million MWh.

[18] See Allen Direct Testimony at 9:9-15.

[19] Note that there could be instances where the reconciliation process is delayed which would further disconnect the reconciliation adjustment from when actual revenues and costs are incurred.

expected to be a relatively insignificant portion of the total customer retail rate. Second, an analysis of the estimated reconciliation based on wholesale market data for the years 2011-2015 shows that the impact of the reconciliation process will also be small. For example, assuming generation unit forecast energy market revenues are based on forward market data at the time the rate is set, I estimated that the impact of reconciliation could range from -$2/MWh to $2/MWh.[20] Third, the SSO and CRES provider power supply rates will be adjusted upward and downward as wholesale market conditions change from year to year. Historically, these changes have been observed to be on the order of -$5/MWh to $10/MWh based on several years of competitive wholesale power procurements carried out by Ohio Edison Company, The Cleveland Electric Illuminating Company, and The Toledo Edison Company (See Attachment AJC-2).[21]

Putting these three rate impacts together reveals that the PPA Rider will have only a modest impact on customer rates, and that there is no guarantee that the combination of the three adjustments will always result in greater rate stability.

Q20. PLEASE EXPLAIN.

A20. Because there are multiple components of the customer rate changing over time, how much the customer rate rises or falls at any particular time when rate changes are implemented is uncertain. For example, assume SSO and CRES provider rates turn out to be stable and change little one year to the next. Customer rates then either will be pushed upward or downward by the forecasted PPA rider, and either will be pushed

[20] In this analysis, I assumed generation unit production and costs are projected accurately and that wholesale energy market prices will represent the greatest uncertainty under the PPA rider reconciliation process. In reality, these reconciliations will also be impacted by variation in projected production.

[21] Attachment AJC-2 uses data for the FirstEnergy utilities as FirstEnergy has been procuring SSO wholesale power supply for its retail customers using a laddering approach since early 2009.

upward or downward by the reconciliation component of the PPA rider. The combination of these two PPA rider rate impacts will determine whether the rate goes up, down, or remains roughly the same. This same logic can be applied for different trends in wholesale market prices and it is difficult to predict what will happen from one rate change to the next.

For example, Attachment AJC-3 shows the possible combinations in changes to the components of the customer rate associated with power supply costs. Attachment AJC-3 shows each of the possible changes that could occur for CRES/SSO rates (rise, fall, or remain level), and then the possible contemporaneous changes in the PPA Rider and PPA Rider reconciliation components. As Attachment AJC-3 shows, in half of those combinations of changes to different rate components, the net impact of the change in all three components affecting the retail customer's power supply rate will be unknown until that time when the rate changes are implemented.

Q21. ARE YOU SAYING THAT THE PPA PROPOSAL WOULD NEVER RESULT IN A MORE STABLE RETAIL RATE?

A21. Not necessarily. There could be instances when the combination of the level and reconciliation of the PPA rider causes the customer rate to go up or down less than it would otherwise absent the rider. If reconciliation was carried out quarterly (an option the Company has indicated it would consider)[22] and wholesale electric energy prices increased or decreased notably prior to reconciliation when compared to the forecast, there could be a notable favorable or unfavorable impact from one quarter to the next.

[22] Allen Direct Testimony at 9:11-12.

However, based on the Company's proposal, and a reasonable estimate of reconciliation impact, the impact on retail rates will not be guaranteed increased rate stability. For example, assuming a relatively high so-called "stabilizing" impact of $4/MWh only results in a 3% impact on the overall rate that an AEP Ohio residential retail customer faces. There is simply no guarantee that retail rates will always be more stable under the PPA proposal, or that customers will realize net benefits in the form of lower overall rates as a result of the PPA proposal.

Q22. HOW DO YOU RESPOND TO MR. ALLEN'S TESTIMONY THAT THE PPA RIDER WILL STABILIZE CUSTOMER RATES?

A22. Mr. Allen seeks to simplify the explanation of the PPA rider impact on customer rates by arguing, in essence, that if power prices are rising, then the PPA Proposal will put downward pressure on customer rates, and that if power prices are falling, the PPA Proposal will put upward pressure on customer rates.[23] Mr. Allen implicitly assumes that the costs of the generation unit rights under the PPA Proposal will be uncorrelated with wholesale power prices. Of course, the Company is betting that power prices rise enough to overcome the significant costs associated with the generation rights under the PPA so as to keep rates demonstrably lower than they would otherwise be. However, it is equally plausible that power prices will rise and fall numerous times over the more-than-two-decade-remaining life of some of the generating units (in fact, Attachment AJC-2 shows that this outcome would be consistent with historically observed power prices). With power prices and PPA costs moving in many possible directions over time the supposed additional stability is difficult to quantify. The only certainty offered by the PPA

[23] Allen Direct Testimony at 8:21-9:2.

Proposal is that, based on the available data, the impact of the PPA rider is not expected to be notably significant.

III. PPA Proposal Is Not An Insurance Policy for AEP Ohio Retail Ratepayers

Q23. DOES AEP OHIO CHARACTERIZE ITS PPA PROPOSAL AS AN INSURANCE POLICY?

A23. Yes. AEP Ohio claims that its PPA proposal "will benefit AEP Ohio's customers at the outset by providing an 'insurance policy' to hedge against price spikes caused by market volatility."[24] AEP Ohio goes on further to claim that its proposal provides insurance as it represents "a small payment upfront guard[ing] against larger (potentially difficult to pay) costs later."[25] However, AEP Ohio's PPA Proposal does not predetermine the costs faced by retail customers or guarantee that retail customers will see reduced power costs. It is clearly not an insurance policy.

Q24. HOW DOES AN INSURANCE POLICY WORK?

A24. Insurance provides customers the ability to make a small payment in order to avoid the possibility of a much larger financial loss.[26] Insurance companies can provide customers with the opportunity to make small payments in exchange for protection against a potentially large loss by "pooling" together a large number of customers who all face a similar risk of a low-probability, high-loss event, like damage from a fire or storm. By

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24 Vegas Direct Testimony at 7:3-4.
25 Fetter Direct testimony at 9:23-10:1.
26 See, for example, *The MIT Dictionary of Modern Economics*, 1994, edited by David W. Pearce and Robert Shaw, MIT Press, at 209.

only paying large losses for a small number of customers, an insurer spreads the risk of low-probability events across a large number of customers at a relatively low cost.

Q25. DOES THE AEP OHIO PPA PROPOSAL PROVIDE INSURANCE TO RETAIL RATEPAYERS?

A25. No. The PPA Proposal essentially transfers the AEP Genco ownership rights of nine generating units and OVEC entitlement to AEP Ohio's retail ratepayers at an unknown cost. AEP Ohio retail ratepayers are not making a small payment in order to guard against a low probability, potentially high cost financial exposure. AEP Genco is not an insurance company pooling together many customers making small payments to guard against a catastrophic occurrence. Instead, under the PPA Proposal AEP Ohio is forcing upon its ratepayers a commitment to take on all the risk associated with owning the PPA generating units in the hope that PJM wholesale power prices rise enough in upcoming years to compensate retail customers for the costs of the PPA. Instead of shifting risk (and the unknown costs associated with those risks) away from retail customers, the PPA Proposal causes retail customers to take on more risk in exchange for the possibility that overall customer power payments over numerous years will be lower than they would be otherwise.

Q26. WHAT EVIDENCE IS THERE THAT RETAIL CUSTOMERS ARE TAKING ON THE RISK OF POTENTIALLY COSTLY RATE INCREASES?

A26. The direct testimony of Mr. Pearce provides a schedule of the projected costs associated with the Company's PPA Proposal. His workpapers include more detailed information.[27]

[27] See Competitively Sensitive Confidential AEP Ohio Forecast Workpapers, Attachment KDP 2 Detailed View, provided in response to IEU _RPD-1-003 as Second Supplemental Attachment 1C.

[redacted] These charges are associated with AEP Genco's already invested capital, which it seeks to recover ("of and on") from the AEP Ohio captive ratepayers.[29]

Q27. WHAT IS THE SIGNIFICANCE OF THESE COSTS BEING "SUNK?"

A27. A basic principle of business economics is that a plant (or any type of production facility) is economically viable if its going-forward revenues exceed its total avoidable going-forward costs.[30] For example, if total going-forward revenues are projected to exceed total avoidable going-forward costs, the plant will realize revenues by remaining operational. These revenues defray at least a portion of the unavoidable costs of investment decisions that have already been "sunk". Clearly, a small loss is better than a large one. Therefore, unavoidable (or sunk) costs associated with past investment decisions, such as debts owed that will have to be paid by a plant's owners regardless of whether the plant is operating, play no part in a facility retirement decision.

Q28. WHAT DOES THE INCLUSION OF THESE SUNK COSTS BY AEP GENCO MEAN FOR AEP OHIO'S RETAIL RATEPAYERS UNDER THE PPA PROPOSAL?

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28 [redacted]

29 These costs also include a tax payment which appears to be a transfer from AEP Ohio to AEP Genco to shield AEP Genco from taxes incurred in association with the Companies' capacity payment.

30 See, for example, Colander, D., *Microeconomics, 4th Ed.*, 2001, McGraw-Hill, at 250-251.

A28. It means that AEP Ohio ratepayers take on the responsibility to compensate AEP Genco for all its historical and future investment in the PPA generating units for the life of the units (15-23 years under the PPA Proposal) regardless of whether the generating units receive sufficient revenues from PJM's power markets to cover these costs (and OVEC entitlement as these costs are allocated to AEP Ohio). Moreover, under the proposed PPA, AEP Ohio retail customers will be required to compensate AEP Genco for generating unit undepreciated plant-in-service balances if a generating unit is removed from the agreement early or in the event AEP Ohio receives a Commission order that calls for a one-time significant disallowance for retail rate recovery.[31] AEP Ohio's ratepayers will ensure that AEP Genco profits from the operation of these generating units regardless of whether there is value to its customers, and that any undepreciated balances are recovered from retail ratepayers. Finally, the guarantee of full cost recovery means that AEP Genco will have an incentive to continue the operation of these units regardless of whether it would be economically efficient to shut down some of the units over the next 23 years.

Q29. IS THIS CONCERN EVEN MORE PRONOUNCED IN UPCOMING YEARS?

A29. Yes. The Environmental Protection Agency's ("EPA") final Clean Power Plan ("CPP") rule envisions a substantial reduction in the emissions of carbon dioxide in Ohio beginning in the next decade.[32] The EPA technical support documents clearly indicate that existing coal-fired power plants will have to reduce their production in order to meet

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31 See IEU RPD-1-002 Supplemental Attachment 1 at Article II and V. Moreover, the proposed PPA contains a provision where the undepreciated balance of a unit can be allocated to other units in the event the particular unit is retired before its book value is recovered.

32 The EPA projects that Ohio will need to reduce emissions of carbon dioxide substantially beginning in 2022. See, http://www.epa.gov/airquality/cpptoolbox/ohio.pdf, accessed September 10, 2015.

the emission limits.[33] Regardless of the mechanism(s) adopted by states to meet the objectives of the CPP, existing coal-fired power plants will have to run less to comply with the rule. Reduced production from the PPA Proposal generating units will increase customer costs by preventing the generating units from running at levels projected by the Company in its analysis. Retail customers shoulder the significant risk that these generating unit operations will decline materially during the next decade and would be obligated to compensate the units for all costs regardless of their value in the marketplace.

Moreover, under the EPA's CPP existing generation units' owners are expected to make investments to improve the efficiency of older coal-fired generation units in order to reduce emissions of carbon dioxide.[34] Under the PPA Proposal, it can be expected that AEP Genco would have the incentive to make these investments on all its PPA generating units given the guarantee of full cost recovery including a return on equity. The uncertain costly risks faced by AEP Ohio retail ratepayers under the PPA Proposal are even more significant as the U.S. continues transitioning toward a less carbon-intensive economy.

Q30. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?

A30. Yes, although I reserve the right to further supplement my testimony.

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[33] See, generally, http://www.epa.gov/airquality/cpp/tsd-cpp-emission-performance-rate-goal-computation.pdf, accessed September 10, 2015

[34] The EPA assumes that efficiency improvements at existing coal-fired power plants will be part of how states will comply with the CPP. See, http://www.epa.gov/airquality/cpptoolbox/technical-summary-for-states.pdf, accessed September 10, 2015.

CERTIFICATE OF SERVICE

The Public Utilities Commission of Ohio e-filing system will electronically serve notice of the filing of this document on the parties referenced in the service list of the docket card who have electronically subscribed to this case. In addition, the undersigned certifies that a courtesy copy of the foregoing document is also being served upon the persons below via electronic mail this 11th day of September 2015.

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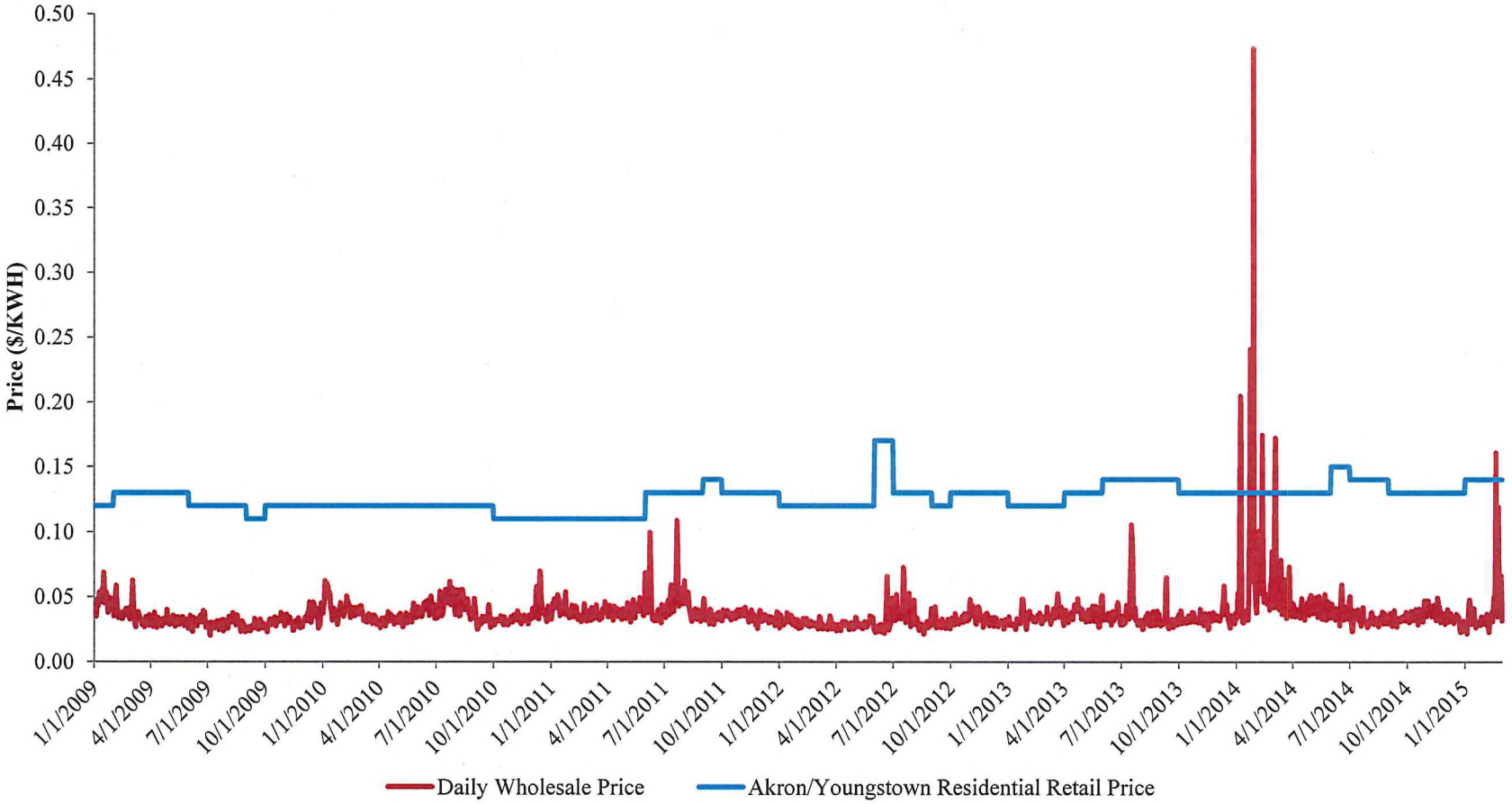
Annualized Volatility at PJM's AEP-Dayton Hub
October 2010 - October 2014

	Product Duration			
Type	Year*	Half-Year*	Quarter*	Day
On-Peak	18%	23%	37%	274%
Off-Peak	16%	22%	33%	200%

Note: * indicates implied volatility based on forward curve; all others indicate historical volatility.

Source: Platts and Compass Lexecon analysis.

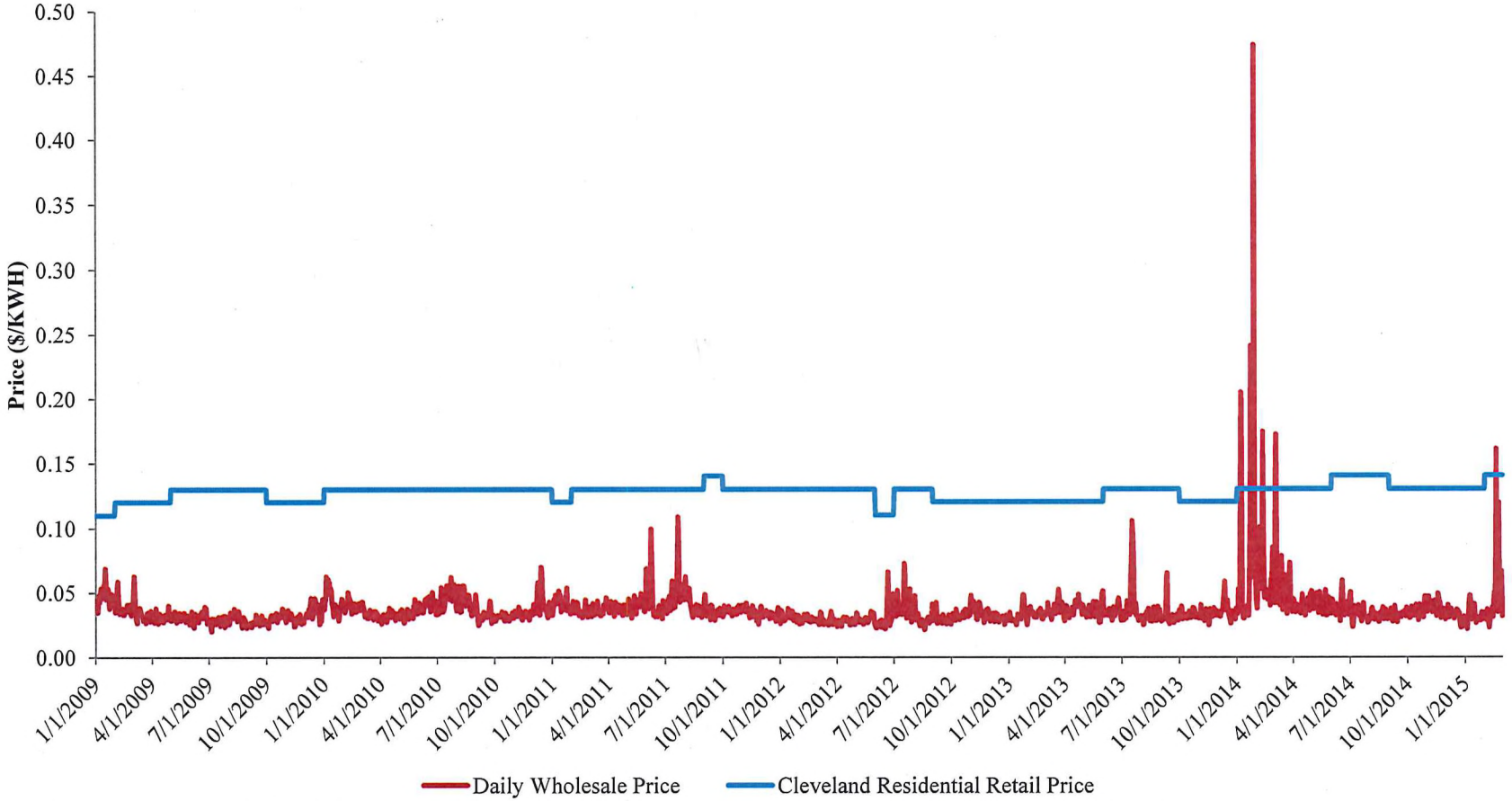
DAILY WHOLESALE PRICE AND AKRON/YOUNGSTOWN STANDARD SERVICE OFFER RESIDENTIAL PRICE 2009-2015



Source: The Public Utilities Commission of Ohio ("PUCO") http://www.puco.ohio.gov/puco/index.cfm/industry-information/statistical-reports/ohio-utility-rate-survey/#sthash.D6DTZpmz.dpbs; ABB Velocity Suite Products.

Note: For the retail price PUCO uses the Standard Service Offer as reported by the "Ohio Utility Rate Survey"; The wholesale price is PJM's AEP/Dayton hub day-ahead daily average hourly price.

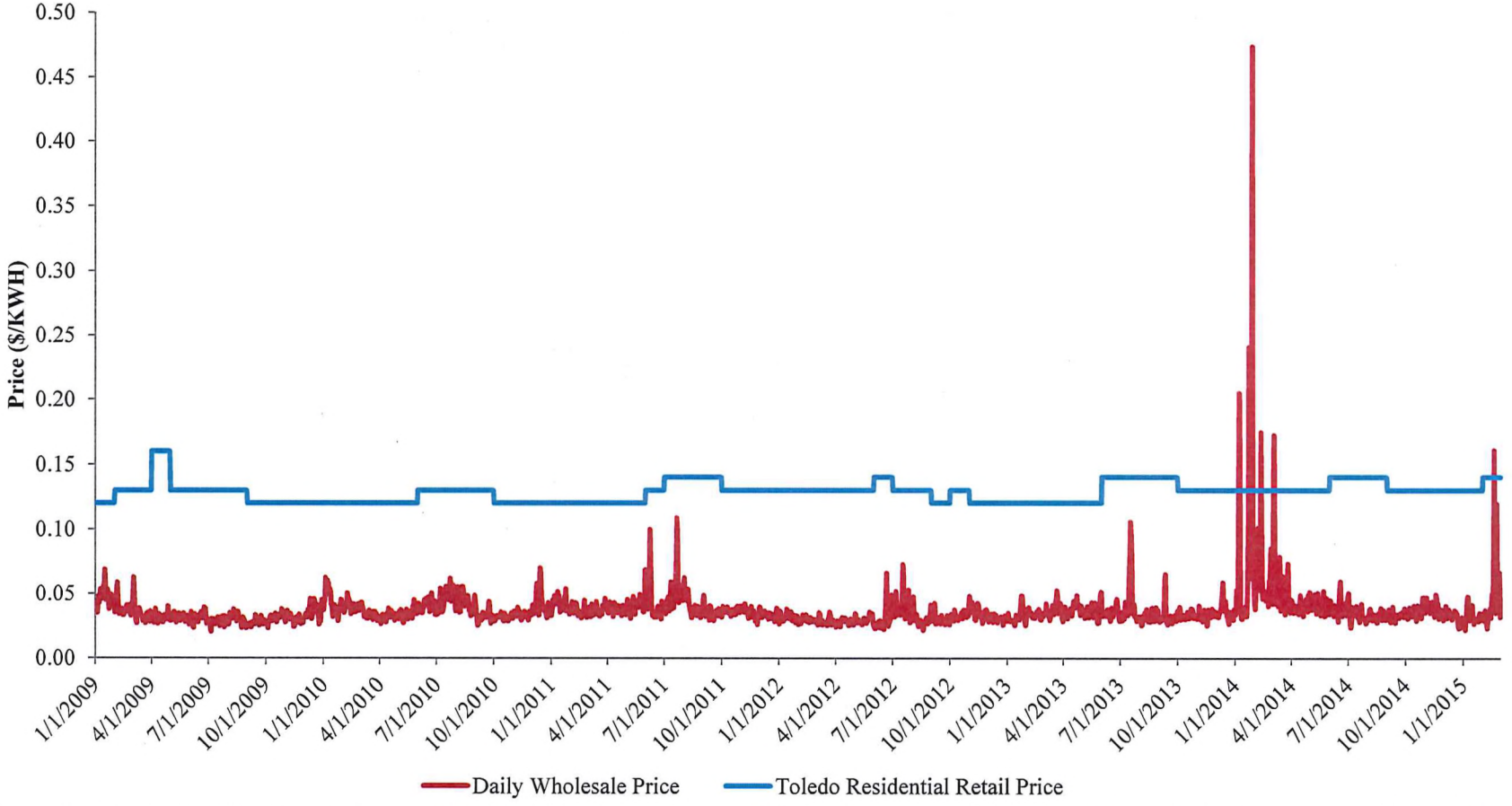
DAILY WHOLESALE PRICE AND CLEVELAND STANDARD SERVICE OFFER RESIDENTIAL PRICE 2009-2015



Source: The Public Utilities Commission of Ohio ("PUCO") http://www.puco.ohio.gov/puco/index.cfm/industry-information/statistical-reports/ohio-utility-rate-survey/#sthash.D6DTZpmz.dpbs; ABB Velocity Suite Products.

Note: For the retail price PUCO uses the Standard Service Offer as reported by the "Ohio Utility Rate Survey"; The wholesale price is PJM's AEP/Dayton hub day-ahead daily average hourly price.

DAILY WHOLESALE PRICE AND TOLEDO STANDARD SERVICE OFFER RESIDENTIAL PRICE 2009-2015



Source: The Public Utilities Commission of Ohio ("PUCO") http://www.puco.ohio.gov/puco/index.cfm/industry-information/statistical-reports/ohio-utility-rate-survey/#sthash.D6DTZpmz.dpbs; ABB Velocity Suite Products.

Note: For the retail price PUCO uses the Standard Service Offer as reported by the "Ohio Utility Rate Survey"; The wholesale price is PJM's AEP/Dayton hub day-ahead daily average hourly price.

Uncertainty of Impact of PPA Proposal on Retail Customer Rates

SSO or CRES Rate	PPA Rider Level	PPA Rider Reconciliation	Net Impact
–	↑	↑	↑
↓	↑	↑	?
↑	↑	↑	↑
–	↓	↓	↓
↓	↓	↓	↓
↑	↓	↓	?
–	↑	↓	?
↓	↑	↓	?
↑	↑	↓	?
–	↓	↑	?
↓	↓	↑	?
↑	↓	↑	?
–	–	↑	↑
↓	–	↑	?
↑	–	↑	↑
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↓	↑	–	?
↑	↑	–	↑
–	–	↓	↓
↓	–	↓	↓
↑	–	↓	?
–	↓	–	↓
↓	↓	–	↓
↑	↓	–	?

Summary of Net Impact
? 12
↑ 6
↓ 6

Note: Permutations where PPA Rider does not change rate have been excluded. All outcomes are assumed to be equally possible.

Attachment AJC-4

To the Direct Testimony of A. Joseph Cavvichi

Contains

Competitively Sensitive Confidential Information

and

Has been Filed under Seal

Attachment AJC-5

CURRICULUM VITAE

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PROFESSIONAL EXPERIENCE

Compass Lexecon, Boston, MA
Executive Vice President, April 2013 – present
Senior Vice President, January 2007 – March 2013
Managing Director, 2003 – 2006
Vice President, 2001 – 2003
Senior Consultant, 1999 – 2001
Consultant, 1997 – 1999

Provides wholesale and retail electricity market regulatory economic analyses in connection with the restructuring of the US electricity industry. In particular, he advises clients in Federal Energy Regulatory Commission matters, state regulatory proceedings, and arbitration and court proceedings. He files testimony, affidavits and expert reports supported by economic analyses.

Extensive knowledge of wholesale market operations with general economic theory of contracting and electricity generation plant dispatch that provides companies with detailed analyses that impact both regulatory and business decisions. Actively involved in the electricity industry both before and after restructuring for a total of more than 20 years.

Tufts University, Medford, MA
Adjunct Instructor, Summer 2000

Taught graduate-level environmental economics.

Massachusetts Institute of Technology, Cambridge, MA
Research Engineer, 1997
Research Assistant, 1995 – 1997

Performed an analysis of water and electricity resources in Mendoza, Argentina. Developed a computer simulation model to support analysis and permit the display of results to a diverse group of stakeholders. Traveled frequently to Mendoza to interact with government officials and relevant institutions in an effort to establish electricity and water policy.

Massachusetts Institute of Technology, Cambridge, MA
Project Manager/Staff Mechanical Engineer, 1989 – 1995

Managed the development, engineering, and construction of a $40 million, 20 MW gas turbine-based cogeneration facility at the Cambridge campus. Directed all attributes of the project for its three-year duration. Involved extensively in energy conservation programs with emphasis on building and utility plant optimization through innovative engineering applications.

Carrier Building Systems and Services, Waltham, MA
Project Engineer, 1987 – 1988

Engineered and managed the installation of Energy Management Systems used exclusively for demand-side management. Interfaced direct digital control systems to mechanical equipment associated with thermal systems of industrial, commercial, and educational buildings.

EDUCATION

Massachusetts Institute of Technology, Cambridge, MA
S.M. in Technology Policy, 1997

Tufts University, Medford, MA
S.M. in Environmental Engineering, 1992

University of Connecticut, Storrs, CT
B.S. in Mechanical Engineering, 1987

TESTIMONY

Iberdrola Renewables, LLC

Before the Federal Energy Regulatory Comission, Docket Nos. EL02-60-007 and EL02-62-006 (Consolidated). Prepared Answering Testimony of A. Joseph Cavicchi on behalf of Iberdrola Renewables, LLC, July 21,2015.

San Diego Gas and Electric Company

Naturener USA, LLC, et al. v. San Diego Gas & Electric Company, in the Montana Ninth Judicial District Court, Toole County. Declaration, Non-Public (January 22, 2014).

PPL EnergyPlus

Before the Federal Energy Regulatory Commission. RE : Triennial Market-Based Rate Update for the Northeast Region, PPL Electric Utilities Corporation et al, Dockets ER 10-2010 et al. Affidavit of A. Joseph Cavicchi, December 31, 2013, Written, Public.

Before the Federal Energy Regulatory Commission. RE : Triennial Market-Based Rate Update for the Northwest Region, PPL EnergyPlus LLC et al, Dockets ER 10-2011 et al. Affidavit of A. Joseph Cavicchi, December 31, 2013, Written, Public.

Transalta Energy Marketing

Before the Federal Energy Regulatory Commission, Puget Sound Energy, Inc., Complainant v. All Jurisdictional Sellers of Energy and/or Capacity at Wholesale into Electric Energy and/or Capacity Markets in the Pacific Northwest, Including Parties to the Western System Power Pool Agreement Participants, Docket. No. EL01-085. Prepared Answering Testimony of A. Joseph Cavicchi on behalf of Transalta Energy Marketing (U.S.) Inc. and Transalta Energy Marketing (California) Inc., December 17, 2012. Deposition of A. Joseph Cavicchi on behalf of Transalta Energy Marketing (California) Inc., February 8, 2013. Testimony of A. Joseph Cavicchi, October 21 and 22, 2013, Oral, Public.

Avista Corporation et al

Before the Federal Energy Regulatory Commission. In the Matter of Puget Sound Energy, Inc. v. All Jurisdictional Sellers of Energy and/or Capacity at Wholesale into Electric Energy and/or Capacity Markets in the Pacific Northwest, including Parties to the Western Systems Power Pool Agreement. Docket EL01-10-085. Testimony of A. Joseph Cavicchi, September 26, 2013. Oral, public. Answering Testimony of A. Joseph Cavicchi on behalf of Avista Corporation et al. ("Joint Defense Group"), June 24, 2013. Deposition of A. Joseph Cavicchi on behalf of Avista Corporation et al, July 9, 2013.

Department of Justice

Before the United States Court of Federal Claims, Pacific Gas and Electric Company and Southern California Edison Company, Plaintiffs et al v. The United States, Defendant, No. 07-157C, No. 07-167C (Consolidated), No. 07-184C. Deposition of A. Joseph Cavicchi, March 27, 2013. Confidential, Subject to Protective Order.

Before the United States Court of Federal Claims, Pacific Gas and Electric Company and Southern California Edison Company, Plaintiffs et al v. The United States, Defendant, No. 07-157C, No. 07-167C (Consolidated), No. 07-184C. Expert Report of A. Joseph Cavicchi, March 1, 2013. Confidential, Subject to Protective Order.

PPL Montana and PPL EnergyPlus

Before the Federal Energy Regulatory Commission, Puget Sound Energy, Inc., Complainant v. All Jurisdictional Sellers of Energy and/or Capacity at Wholesale into Electric Energy and/or Capacity Markets in the Pacific Northwest, Including Parties to the Western System Power Pool Agreement Participants, Docket. No. EL01-085. Prepared Answering Testimony of A. Joseph Cavicchi on behalf of PPL Montana and PPL EnergyPlus, December 17, 2012. Written, Public. Deposition of A. Joseph Cavicchi on behalf of PPL Montana and PPL EnergyPlus, February 8, 2013.

Constellation New Energy

Before the Federal Energy Regulatory Commission, Puget Sound Energy, Inc., Complainant v. All Jurisdictional Sellers of Energy and/or Capacity at Wholesale into Electric Energy and/or Capacity Markets in the Pacific Northwest, Including Parties to the Western System Power Pool Agreement Participants, Docket. No. EL01-085. Prepared Answering Testimony of A. Joseph Cavicchi on behalf of Constellation Energy Commodities Group, December 17, 2012. Written, Public. Deposition of A. Joseph Cavicchi on behalf of Constellation Energy Commodities Group, February 8, 2013.

Constellation NewEnergy

Before the Federal Energy Regulatory Commission, San Diego Gas & Electric Company, Complainant, v. Sellers of Energy and Ancillary Services into Markets Operated by the CA ISO and CA Power Exchange, et al., Respondents, Docket No. EL00-95-248. Direct Testimony and Exhibits of Constellation NewEnergy, Inc. Testimony of A. Joseph Cavicchi on behalf of Constellation NewEnergy, July 11, 2012. Oral, Public.

PPL Electric Utility Corporation

Before the Pennsylvania Public Utility Commission, Docket No. P-2012-2302074, PPL Electric Utility Corporation. Statement No. 2. Direct Testimony of A. Joseph Cavicchi, May 16, 2012. Statement No. 2-R. Direct Testimony of A.

Joseph Cavicchi, August 17, 2012. Statement No. 3. Testimony of A. Joseph Cavicchi, September 10, 2012. Oral, Public.

PPL Corporation

Before the Federal Energy Regulatory Commission, RE: Notice of Change in Status Regarding Market-Based Rate Authority, Docket No. ER10-2016-___ et al. Affidavit of A. Joseph Cavicchi on behalf of PPL Corporation, January 30, 2012. Written, Public.

Entegra Power Services, LLC

Before the Federal Energy Regulatory Commission, Union Power Partners LP, Docket No. ER05-1191-016, Entegra Power Services LLC, Docket No. ER09-838-002. Updated Market Power Analysis for Market-Based Rates. Affidavit of A. Joseph Cavicchi, December 29, 2011.

Constellation NewEnergy, Inc.

Before the Federal Energy Regulatory Commission, San Diego Gas & Electric Company, Complainant, v. Sellers of Energy and Ancillary Services into Markets Operated by the CA ISO and CA Power Exchange, et al., Respondents, Docket No. EL00-95-248. Direct Testimony and Exhibits of Constellation NewEnergy, Inc. Direct and Answering Testimony and Exhibits of A. Joseph Cavicchi on behalf of Constellation NewEnergy, October 25, 2011. Written, Public.

CP Energy

Before the Federal Energy Regulatory Commission, RE: Triennial Market-Based Rate Update for the Northeast Region, Docket No. ER10-1342 et al. Affidavit of A. Joseph Cavicchi, June 30, 2011. Written, Public.

Edison Mission.

Before the Federal Energy Regulatory Commission, RE: Triennial Market-Based Rate Update for the Northeast Region, Edison Mission Marketing and Trading, et al., Docket No. ER11-___-000, et al. Affidavit of A. Joseph Cavicchi, June 29, 2011. Written, Public.

Entegra Power Services, LLC

Before the Federal Energy Regulatory Commission, Gila River Energy Supply LLC, Docket No. ER11-___-000, Request for Acceptance of Initial Market-Based Rate Tariff, Waivers and Blanket Authority Under Section 205 of the Federal Power Act. Affidavit of A. Joseph Cavicchi, April 11, 2011. Written, Public.

PPL Corporation

Before the Federal Energy Regulatory Commission, Triennial Market-Based Rate Update for the Northwest Region, PPL Northwest Companies, ER10-2011-000 et al. Affidavit of A. Joseph Cavicchi on behalf of the PPL Northwest Companies, January 31, 2011. Written, Public.

Entegra Power Services LLC

Before the Federal Energy Regulatory Commission, Gila River Power, LP, Docket No. ER05-1178-015 and Entegra Power Services LLC, Docket ER09-838-001, Second Supplement to Updated Market Power Analysis for Continued Market-Based Rate Authority in Compliance with Order No. 697. Second Supplement Affidavit of A. Joseph Cavicchi, January 12, 2011. Written, Public.

PPL Corporation

Before the Federal Energy Regulatory Commission, RE: Notice of Change of Status Regarding Market-Based Rate Authority, Docket No. ER10-1511-001 et al. Affidavit of A. Joseph Cavicchi on behalf of PPL Corporation, December 1, 2010. Written, Public.

Entegra Power Services LLC

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Chesapeake Energy Corp., et al.

Before the Public Utilities Commission of the State of Colorado, In the Matter of Commission Consideration of Public Service Company of Colorado Plan in Compliance with House Bill 10-1365 "Clean Air Jobs Act," Docket No. 10M-245E. Testimony of A. Joseph Cavicchi on behalf of Noble Energy, Inc., Chesapeake Energy Corporation and Encana Oil & Gas (USA), November 1, 2010. Oral, Public. November 9, 2010. Written, Public. November 18, 2010. Oral, Public.

Chesapeake Energy Corp., et al.

Before the Public Utilities Commission of the State of Colorado, In the Matter of Commission Consideration of Public Service Company of Colorado Plan in Compliance with House Bill 10-1365 "Clean Air Jobs Act," Docket No. 10M-245E. Cross Answer Testimony and Exhibits of A. Joseph Cavicchi on behalf of Noble Energy, Inc., Chesapeake Energy Corporation and Encana Oil & Gas (USA), October 8, 2010. Written Report Public, Exhibits Confidential, Filed Under Seal.

Chesapeake Energy Corp., et al.

Before the Public Utilities Commission of the State of Colorado, In the Matter of Commission Consideration of Public Service Company of Colorado Plan in Compliance with House Bill 10-1365 "Clean Air Jobs Act," Docket No. 10M-245E. Answer Testimony and Exhibits of A. Joseph Cavicchi on behalf of Noble Energy, Inc., Chesapeake Energy Corporation and Encana Oil & Gas (USA), September 17, 2010. Written, Confidential.

PPL Electric Utilities Corporation

Before the Pennsylvania Public Utility Commission, RE: Petition of PPL Electric Utilities Corporation for Approval of a Default Service Program and Procurement Plan for the Period January 1, 2011 through May 31, 2014, Docket No. P-2008-2060309. Statement No. 2. Direct Testimony of A. Joseph Cavicchi on behalf of PPL Electric, September 14, 2010. Oral, Written and Public.

PPL Corporation and E.ON U.S.

Before the Federal Energy Regulatory Commission, RE: PPL Corporation and E.ON U.S. LLC Application for Authorization Under Section 203 of the Federal Power Act, Request for Waivers of Filing Requirements, and Confidential Treatment of Agreement and Workpapers, Docket No. EC10-77-000. Affidavit of Dr. Joseph P. Kalt and Mr. A. Joseph Cavicchi, June 28, 2010.

BG Masspower

Before the Commonwealth of Massachusetts Trial Court, Suffolk, SS, Civil Action 07-3243 (BLS2), Masspower, by its General Partners, BG MP Partners I, LLC, and BG MP Partners II, LLC, Plaintiffs, v. Massachusetts Municipal Wholesale Electric Company, Defendant. Deposition of A. Joseph Cavicchi on behalf of Masspower, February 19, 2010. Testimony of A. Joseph Cavicchi on behalf of Masspower, March 18 and 19, 2010. Oral, Public.

Allegheny

Before the Federal Energy Regulatory Commission, State of California ex rel. Lockyer v. British Columbia Power Exchange Corp., et al., Docket No. EL02-71-017 et al. Prepared Answering Testimony of A. Joseph Cavicchi on behalf of Allegheny Energy, September 17, 2009. Written, Public.

MPS Merchant Services

Before the Federal Energy Regulatory Commission, State of California ex rel. Lockyer v. British Columbia Power Exchange Corp., et al., Docket No. EL02-71-017. Prepared Answering Testimony of A. Joseph Cavicchi on behalf of MPS Merchant Services, September 17, 2009. Written, Public.

PPL Montana, LLC

Before the Federal Energy Regulatory Commission, State of California ex rel. Lockyer v. British Columbia Power Exchange Corp., et al., Docket No. EL02-71-017. Answering Testimony of A. Joseph Cavicchi on behalf of PPL Montana, LLC, September 17, 2009. Written, Public.

Constellation New Energy

Before the Federal Energy Regulatory Commission, San Diego Gas and Electric Co. v. Sellers of Energy and Ancillary Services, Docket No. EL00-95 et al. Affidavit of A. Joseph Cavicchi on behalf of Constellation New Energy, August 4, 2009. Written, Public.

Energy Northwest

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Entegra Power Services LLC

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Union Pacific Railroad Company

In the Matter of the Arbitration between Wisconsin Public Service Corporation and Union Pacific Railroad Company. Rebuttal Expert Report of A. Joseph Cavicchi, February 16, 2009.

PPL Electric Utilities Corporation

Before the Pennsylvania Public Utility Commission, RE: Petition of PPL Electric Utilities Corporation for Approval of a Default Service Program and Procurement Plan for the Period January 1, 2001 through May 31, 2014, Docket No. P-2008-2060309. Testimony of A. Joseph Cavicchi on behalf of PPL Electric Utilities Corporation, February 11, 2009. Oral, Public.

PPL Electric Utilities Corporation

Before the Pennsylvania Public Utility Commission, Docket No. P-2008-2060309. Rebuttal Testimony of A. Joseph Cavicchi on behalf of PPL Electric Utilities Corporation, January 20, 2009.

Union Power Partners, L.P.

United States of America, Before the Federal Regulatory Commission, Docket No. ER05-1191-014, Updated Market Power Analysis for Continued Market-Based Rate Authority. Affidavit of A. Joseph Cavicchi on behalf Union Power Partners, L.P., December 30, 2008.

PPL Electric Utilities Corporation

Before the Pennsylvania Public Utility Commission, Docket No. P-2008-2060309, Supplemental Testimony of A. Joseph Cavicchi of behalf of PPL Electric Utilities Corporation, November 3, 2008.

PPL Electric Utilities Corporation

Before the Pennsylvania Public Utility Commission, Docket No. P-2008-2060309. Testimony of A. Joseph Cavicchi of behalf of PPL Electric Utilities Corporation, September 11, 2008.

PPL Electric Utilities Corporation

United States of America, Before the Federal Regulatory Commission, Docket No. ER00-1712-008, ER02-2408-003, ER00-744-006, ER02-1327-005, ER00-1703-003, ER02-1749-003, ER02-1747-003, ER99-4503-005, ER00-2186-003, ER01-1559-004. Affidavit of A. Joseph Cavicchi on behalf of PPL Companies, September 2, 2008.

PPL Electric Utilities Corporation

United States of America, Before the Federal Regulatory Commission, Docket No. EL08-67-000. Affidavit of A. Joseph Cavicchi (with Joseph P. Kalt) on behalf of PPL Companies, August 12, 2008.

PPL Electric Utilities Corporation

United States of America, Before the Federal Regulatory Commission, Docket No. EL08-67-000. Affidavit of A. Joseph Cavicchi (with Joseph P. Kalt) on behalf of PPL Companies, July 11, 2008.

Entegra Power Group L.L.C.

United States of America, Before the Federal Regulatory Commission, Docket Nos. ER05-1178-00 and ER05-1191-00. Affidavit of A. Joseph Cavicchi on behalf of Entegra Power Group L.L.C, Gila River Power, L.P., Union Power Partners, L.P., Harbinger Capital Partners Master Fund I, Ltd., and Harbinger Capital Partners Special Situations Fund, LP, May 30, 2008.

Harbinger

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IEPA

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Submission of comments on the investigation by the Massachusetts DTE on its own motion into the Provision of Default Service, DTE 02-40-B (with Charles Augustine), May 28, 2003.

BUSINESS STRATEGY ANALYSES

Electricity Generation Facility Developers
Oversees the development and implementation of transmission-constrained dispatch modeling for proposed electricity generation units locating in the Northeastern, Mid-Atlantic, and Midwestern United States. Analyses typically focus on determining likely facility capacity factors and impacts on local and regional air pollutant emissions as well as on wholesale electricity prices. In addition, these analyses provide detailed knowledge of new facilities' impacts on the operation of the electricity transmission system that is critical to assessing the ability of a generating unit to deliver its power in a wide geographical area.

Electricity Distribution Companies

Provide extensive strategic advice and analytical support to electricity distribution companies that are required to assess new wholesale marketplaces in order to fulfill their regulatory commitments as providers of last resort or default electricity service. In most instances these companies require assistance with the development and issuance of requests for proposals as well as rapid evaluation of commodity bids. The assignments combine extensive knowledge of wholesale market operations with general economic theory of contracting and electricity generation plant dispatch in order to provide companies with an approach to commodity procurement that agrees with their risk profile. In most cases there are numerous business and regulatory concerns that are incorporated into the procurement strategies. Additionally, each assignment typically requires extensive analysis of customer demand patterns and wholesale market prices in order to develop market-based customer service cost forecasts.

PUBLICATIONS

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"Lessons Learned from Existing Scarcity and Shorage Pricing Rules," Federal Energy Regulatory Commission, October 28, 2014.

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"Projecting Electricity Prices for a Restructured Electricity Industry," EXNET Merchant Power Plant Conference, Washington, DC, June 3, 1999.

"Transmission Planning and Competitive Generation Markets: The New England Case," EUCI conference on Transmission Restructuring for Retail Competition, Denver, CO, March 25, 1999.

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"Successfully Forecasting the Price of Energy and Other Products," workshop presented at IBC's conference on Successful Load Profiling, San Francisco, CA, December 2, 1998.

"International Perspective: Lessons from the US Deregulation Experience," Nordic Power '98, Stockholm, Sweden, October 7, 1998.

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"Managing Market Share Loss with the Opening of Retail Markets to Competition," Electric Utility Business Environment Conference, Denver, CO, June 24, 1998.

"Multi-Attribute Trade-Off Analysis for Water and Electricity Policy Development," presented in Mendoza, Argentina, July 1996 and April 1997.

"The Basics of Cogeneration," presented at the Tufts University Forum on Energy Conservation, December 1993.

"Implications and History of the MIT Cogeneration Project," presented to the Massachusetts Society of Professional Engineers, November 1993.

CERTIFICATIONS

Registered Professional Engineer, Commonwealth of Massachusetts, 1992 - .

PROFESSIONAL AFFILIATIONS

Member, Board of Directors, Northeast Energy and Commerce Association, 2002-2012.