

COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION OF KENTUCKY

IN THE MATTER OF:

**ELECTRONIC JOINT APPLICATION OF AMERICAN)
ELECTRIC POWER COMPANY, INC., KENTUCKY)
POWER COMPANY AND LIBERTY UTILITIES CO.)
FOR APPROVAL OF THE TRANSFER OF OWNERSHIP)
AND CONTROL OF KENTUCKY POWER COMPANY)**

CASE NO. 2021-0481

**REBUTTAL TESTIMONY
AND EXHIBITS
OF
JEFF PLEWES**

ON BEHALF OF

LIBERTY UTILITIES CO.

**CHARLES RIVER ASSOCIATES, INC.
WASHINGTON, DC**

March 2022

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REBUTTAL TESTIMONY OF JEFF PLEWES

I. INTRODUCTION AND SUMMARY

1 Q. Please state your name and business address.

2 A. My name is Jeff Plewes. My business address is Charles River Associates International,
3 Inc. ("CRA"), 1201 F St., NW, Suite 800, Washington, D.C., 20004.

4 Q. What is your occupation and by whom are you employed?

5 A. I am a Principal in the Energy Practice of CRA.

6 Q. Please describe briefly the nature of the consulting services provided by Charles
7 River Associates.

1 A. Charles River Associates is a leading global consulting firm that offers that offers
2 economic, financial, and business management consulting expertise and applies advanced
3 analytic techniques and in-depth industry knowledge to complex engagements for a broad
4 range of clients. Founded in 1965, we work with major law firms, businesses including
5 utilities, accounting firms, and governments in providing advice and a wide range of
6 services. The nature of the Energy practice is to advise our utility and energy clients on
7 rate and regulatory matters and to provide regulatory litigation assistance. Our work
8 product can take the form of economic analysis, regulatory and commercial due diligence,
9 wholesale power market studies and analysis, cost allocation and rate design studies, and
10 other advisory and regulatory studies that evaluate the impacts of rate and regulatory
11 activity for our clients. The practice provides our clients with expert testimony and
12 litigation support assistance as needed. We provide these services across the sectors of
13 electric transmission, distribution, and power generation sectors as well as natural gas
14 distribution.

15 **Q. Please state your educational background and experience.**

16 A. I received a Bachelor of Science degree from the University of Virginia and a Master
17 of Business Administration degree from the School of Management at Yale University.

18 My professional experience within CRA's Energy Practice has focused on the
19 economic analysis of energy and environmental policy and market design. I have
20 worked with companies throughout the energy sector to help them understand the

1 implications of public policies and regulations on their operations, assets, and
2 investment decisions, and to communicate those impacts to regulators and policy
3 makers. I have led projects for clients in each of the North American competitive
4 electricity markets and for many regulated utility clients, including internationally.
5 Broader areas of my focus have included resource adequacy, climate policy, electricity
6 and capacity market strategy, economic impact analysis, and modeling natural gas
7 production and exports. I support this work with quantitative analysis using advanced
8 energy and economic modeling tools.

9 Relevant to this matter, I have worked for clients on capacity market matters for
10 nearly a decade. I have participated in capacity market related stakeholder processes in
11 multiple markets, including PJM, ISO New England (“ISO-NE”), Midcontinent USO
12 (“MISO”), Alberta, the Electric Reliability Council of Texas (“ERCOT”), and in FERC
13 proceedings on resource adequacy. I have worked with multiple PJM Capacity Market
14 participants on understanding market design and optimal participation strategies,
15 including insurance and bidding strategies related to Capacity Performance in PJM.

16 My professional qualifications are also found in **EXHIBIT_(JP-1)**.

17 **Q. Have you previously provided testimony before the Kentucky Public Service**
18 **Commission (“KPSC”)?**

19 **A. No.**

20

1 **Q. Have you previously provided testimony before other regulatory commissions?**

2 A. Yes. I have submitted testimony before the Indiana Utility Regulatory Commission, the
3 Minnesota Public Utilities Commission, the Public Utilities Commission of Ohio, and
4 the New York Public Services Commission. I have also authored studies and reports,
5 many without specific attribution, that have been filed with multiple state utilities
6 commissions, the U.S. Department of Energy, the U.S. Environmental Protection
7 Agency, and the Federal Energy Regulatory Commission. In addition, I have provided
8 expert testimony in the Supreme Court of the State of New York.

9 **Q. On whose behalf are you testifying in this proceeding?**

10 A. I am testifying on behalf of Liberty Utilities Company (“Liberty”).

11 **Q. What is the purpose of your testimony?**

12 A. The purpose of my testimony is to address several topics raised by Witness Hoatson and
13 Witness Baron regarding options available to Kentucky Power Company (“KPCo”) for
14 ensuring resource adequacy going forward. I aim to bring greater clarity to the
15 discussion of KPCo’s future participation in the PJM Capacity Market. I address the
16 possibility of KPCo meeting its capacity obligations outside of the PJM Capacity
17 Market as a Fixed Resource Requirement (“FRR”) entity, consistent with its current
18 approach within AEP. I also discuss KPCo participating as a stand-alone capacity zone,
19 which is an outcome recommended by some intervenors.

1 **Q. What are your main findings?**

2 A. I find that there is no foregone conclusion regarding the optimal approach for KPCo to
3 ensure resource adequacy after the Bridge PCA with AEP expires. There are simply too
4 many uncertainties regarding PJM capacity market design, future generation and load
5 levels in the KPCo region, and other key considerations that would impact the optimal
6 outcome. I believe Liberty's plan to evaluate options in a future study is reasonable. I
7 do not believe that KPCo departing the AEP East PCA brings material performance risk
8 or costs. Finally, I find that KPCo participating as a stand-alone zone in the PJM
9 Capacity Market, if even possible, could carry capacity cost risk and should be studied
10 before any recommendations are made.

11

12 **II. FRR BACKGROUND**

13

14 **Q. Please provide a brief overview of FRR**

15 A. The PJM Capacity Market, first implemented in 2007, was designed to procure capacity
16 on behalf of load-serving entities through annual auctions. Through these auctions, PJM
17 procures sufficient capacity to ensure resource adequacy for participating service areas.
18 The auctions result in zonal capacity prices which are paid by load-serving entities and
19 distributed to resource owners. Capacity prices in PJM have fluctuated significantly due
20 to changes in market fundamentals, generation mix, and market design.

1 Under the FRR alternative, a load-serving entity that chooses FRR is responsible
2 for procuring its own capacity supply to meet its capacity obligation. It does not
3 participate in the PJM Capacity Market. There is significant flexibility in how the
4 capacity obligation is met. FRR entities may use owned capacity or may contract for
5 capacity with any qualifying resources. The FRR entity must demonstrate to PJM that
6 it has obtained enough capacity to meet its load plus the required reserve margin in the
7 FRR service area for each capacity delivery year.

8 **Q. What Load Serving Entities have selected FRR?**

9 A. An FRR alternative has been available in the PJM Capacity Market since it was
10 implemented in 2007. At the time, AEP was a vertically integrated utility entering PJM
11 in all regards except the capacity construct. The FRR alternative allowed AEP to meet
12 its capacity obligation through its owned generation in a standard cost of service model
13 approved by its regulators, rather than relying on uncertain outcomes in the PJM
14 Capacity Market. AEP has maintained its status as an FRR entity throughout the history
15 of the PJM Capacity Market. Other entities selecting FRR include COMED (Delivery
16 Years 2017/18 through 2018/19), Duke Energy Ohio and Kentucky (Delivery Years
17 2015/16 through 2023/24), East Kentucky Power Cooperative (Delivery Years 2016/17
18 through 2021/22), and, most recently, Dominion (Delivery Years 2022/23 and 2023/24).

19 **Q. What are some of the benefits of the FRR alternative?**

1 A. Load serving entities (“LSEs”) select the FRR alternative for a variety of reasons
2 specific to their situations, and the benefits vary based on the situations as well as the
3 approaches to satisfying capacity obligations. For many, the FRR alternative brings
4 greater capacity cost certainty, which can be valuable because the PJM Capacity Market
5 is notorious for annual rule changes, with some substantial enough to dramatically
6 swing capacity prices. The FRR alternative allows utilities to contract capacity to meet
7 the LSE’s entire load for whatever duration it considers optimal.

8 Another significant benefit that has received attention in recent years is that an
9 FRR alternative allows LSEs to contract capacity from resources that may be
10 administratively prevented from clearing in the PJM Capacity Market.¹ This allows the
11 LSEs, and therefore their ratepayers, to avoid double paying for capacity when resource
12 adequacy is provided by certain policy-supported resources. This was a primary driver
13 for serious consideration of the FRR alternative in Illinois, Ohio, Maryland, and New
14 Jersey, as well as the ultimate election of the FRR alternative by Dominion. These
15 entities saw the FRR alternative as a potential way to support their energy transition.

16 There are other potential benefits. For example, FRR entities only need to demonstrate
17 an amount of capacity equal to load plus the reserve margin, while the PJM Capacity
18 Market has consistently purchased capacity well beyond that level. Also, there can be

¹ An example of an administrative barrier to capacity clearing in the PJM Capacity Auction is the set of Minimum Offer Price (“MOPR”) rules proposed for PJM that would not allow certain resources receiving state subsidies to factor their subsidies into their capacity market offers. This could “price them out” of receiving a capacity obligation even though they may still be online providing capacity value.

1 certain benefits to an FRR entity from netting performance of capacity resources under
2 the PJM Capacity Performance construct.

3
4 **III. THE KPCO FRR DECISION**

5
6 **Q. The Hoatson Testimony states that “...continued participation in the PJM capacity**
7 **market as an FRR entity exposes Kentucky Power’s customers to similar costs and**
8 **risks as fully exiting the PJM market.” Do you agree?**

9 A. No. KPCo fully departing from PJM membership is very different from KPCo
10 remaining in PJM while electing the FRR alternative for meeting its capacity
11 obligations. To be clear, electing the FRR alternative can only be done while KPCo
12 maintains full membership in PJM. It would only mean that KPCo would not participate
13 in the PJM Capacity Market. The FRR alternative is confined to capacity procurement,
14 while a full PJM departure touches many other ratepayer cost and risk categories.

15 I would also add that Witness Hoatson’s testimony often conflates leaving PJM
16 with electing the FRR alternative and it is difficult to decipher which critiques are aimed
17 at which action. For purposes of this rebuttal, I assume that the critiques addressed
18 below are aimed at the FRR election.

1 **Q. The Hoatson Testimony states that LS Power would oppose KPCo remaining an**
2 **FRR entity within PJM.² Is this position consistent with LS Power’s position**
3 **expressed in other regulatory jurisdictions?**

4 A. Yes. LS Power has opposed multiple FRR elections across the PJM footprint. For
5 example, LS Power opposed the FRR alternative in the Resource Adequacy docket in
6 New Jersey.³ It also challenged the Dominion FRR before FERC and was rejected.⁴
7 Minimizing FRR elections is consistent with maximizing demand within the PJM
8 Capacity Market, which, in turn, keeps capacity prices higher. Higher capacity prices
9 can be beneficial to capacity resource owners like LS Power, which owns over 11,000
10 MW of capacity in PJM.⁵ This benefit to resource owners can exist even in cases when
11 higher prices are not beneficial to ratepayers.

12 The downward impact of FRRs on market capacity prices is demonstrated by
13 analysis conducted by the PJM Internal Market Monitor (“IMM”). In the past few years,
14 the IMM published multiple reports that evaluated the impacts of potential FRR
15 elections in multiple states, including Ohio, New Jersey, Maryland, and Virginia.⁶ In

² Hoatson Testimony, p.7.

³ In the Matter of the BPU Investigation of Resource Adequacy Alternatives Rate Counsel’s Response to Staff Request for Written Comments BPU Docket No.: EO20030203, Comments of LS Power Development L.L.C. Comments, May 20, 2020.

⁴ <https://www.capitaliq.spglobal.com/web/client?auth=inherit#news/article?id=65554667> (EL21-72)

⁵ As of June 2021.

⁶ Monitoring Analytics, Independent Market Monitor for PJM: “Potential Impacts of the Creation of Virginia FRRs,” May 18, 2021; “Potential Impacts of the Creation of Ohio FRRs,” July 17, 2020; “Potential Impacts of the Creation of Maryland FRRs,” April 16, 2020; “Potential Impacts of the Creation of Ohio FRRs,” July 17, 2020.

1 each report, scenarios show significant downward pressure on capacity prices in the
2 regions that are outside of FRR service areas. For example, in its study on a Virginia
3 FRR, the IMM states “. . . the Rest of RTO clearing price would decrease by \$50.00 per
4 MW-day to \$90.00 per MW-day, or 35.7% compared to the results of the 2021/2022
5 RPM BRA.”⁷ Such a decrease in capacity prices should obviously be a significant
6 concern for capacity resource owners.

7 **Q. Would ratepayers be better off with KPCo remaining an FRR entity or**
8 **transitioning to full participation in the PJM Capacity Market as suggested by LS**
9 **Power?**

10 A. This question requires study, as proposed by Liberty. There are many factors that will
11 determine whether the FRR alternative is optimal from the KPCo ratepayer perspective.
12 Some of these factors are determinable with study of currently known variables, others
13 require informed analysis and forecasts of future market and regulatory developments.
14 I do not believe that any parties currently know the optimal approach for KPCo at this
15 time, and therefore it should be studied well before the first PJM Capacity Market Base
16 Residual Auction (“BRA”) that will be held after the Bridge PCA period.

17 The various IMM reports on proposed FRRs suggest that the answer depends on
18 the situation and assumptions. Each study presents paired scenarios that vary only by

⁷ IMM report on Virginia FRRs, p.2.

1 FRR capacity cost levels. Scenarios with high assumed FRR contracted prices result in
2 ratepayer costs, while scenarios with low assumed FRR contracted prices result in
3 ratepayer benefits. Also, these costs are only a portion of overall costs and benefits of
4 FRR election.

5 Highlighting the IMM findings does not mean I subscribe to Witness Hoatson's
6 identification of the IMM as a proper evaluator of whether KPCo should remain an FRR
7 entity. While the IMM is well-positioned to estimate the impacts on prices in the rest of
8 the PJM Capacity Market, its FRR studies made very simple assumptions about the
9 costs of capacity in the prospective FRRs, and these are critical determinants of the
10 overall solution.

11 **Q. The Hoatson Testimony suggests that an FRR election would stick ratepayers with**
12 **higher costs.⁸ Do you agree?**

13 A. No. The PJM rules are not restrictive on the ways an FRR entity can meet its capacity
14 obligations and leave significant room for structures beneficial to ratepayers. As an FRR
15 entity, KPCo could sign capacity contracts with a range of durations and with specific
16 performance requirements. They could even include pricing provisions tied to PJM
17 capacity auction outcomes. If KPCo signed multi-year, fixed price capacity contracts,
18 the result may indeed be that capacity prices are held up during a decreasing PJM

⁸ Hoatson Testimony, p.8.

1 capacity price period. However, the opposite would also be true during periods of
2 escalating market capacity costs, with the FRR plan insulating ratepayers.

3 Because there are many options for obtaining capacity, it is inappropriate to
4 focus on only one existing FRR capacity cost, as the Hoatson Testimony does with the
5 Appalachian Power Company (“APCO”). APCO has a utility-specific capacity rate
6 calculation based on cost-of-service data filed with FERC.⁹ This unique approach would
7 not likely be replicated by KPCo, which has a very different resource mix.

8 **Q. The Hoatson Testimony also suggests that an FRR election will “. . . make the**
9 **region less attractive for renewable energy development.”¹⁰ Do you agree?**

10 A. No. There are many reasons to believe that an FRR election could better support
11 significant new renewable capacity in the KPCo service area. An FRR capacity plan can
12 be designed to be supportive of any resource type, even more so than full PJM Capacity
13 Market participation. First, the FRR alternative has recently been considered in multiple
14 PJM markets for precisely this benefit. Under certain PJM Capacity Market rules that
15 may very well return in a few years, new state-supported energy capacity, which in
16 many cases is renewable energy, would not be compensated for the capacity value it
17 provides unless it is brought into an FRR plan.

⁹ RAA Schedule 8.1, Appendix 2.

¹⁰ Hoatson Testimony, p.5.

1 Also, there are many regions outside of PJM, such as MISO, that have capacity
2 constructs where the utility is responsible for demonstrating its capacity in a similar way
3 to the FRR alternative. Some of the utilities in these regions are undergoing dramatic
4 shifts to clean energy and other new resources at far faster rates than utilities in PJM,
5 and they do not appear to be constrained by their capacity construct.

6 Finally, it is also unclear what level of renewable penetration the current PJM
7 Capacity Market design can accommodate before a major redesign is necessary. The
8 FRR alternative may be a safe harbor for clean energy and other resources during future
9 turbulent times, particularly when long-term capacity contracts are potentially available.
10 It is well known that price certainty is supportive of new energy development.

11 **Q. The Hoatson Testimony states that resources not included in a FRR capacity plan**
12 **are excluded from participating in the market. Do you agree?**

13 A. No. KPCo's FRR election does not preclude resources within its service area from
14 participating in the PJM Capacity Market if they are not included in the KPCo FRR
15 capacity plan.

1 about two hours.¹¹ Even if there were more performance events, they are not as costly
2 as the Baron Testimony suggests.¹² The simple example provided in the Baron
3 Testimony overestimates the penalty cost of a one-hour Mitchell outage during a
4 performance event. During events, capacity resources are expected to perform at the
5 average performance level of all capacity resources in the region, which was about 75%
6 for an event in 2019.¹³ The Baron example does not include this necessary multiplier
7 that decreases penalties and increases bonus payment opportunities. It should also be
8 noted that most plants are not expected to have full outages during performance events.

9 Of course, saying a cost is low requires context. From the KPCo ratepayer perspective,
10 these penalty risks, insurance costs, and bonus opportunities are far less important than
11 the overall capacity costs that are either contracted in a KPCo FRR or determined by
12 the PJM Capacity Market. For context, AEP shared a Capacity Performance insurance
13 cost estimate of \$0.34/MW-day.¹⁴ Even if that cost were 10 times greater for a stand-
14 alone KPCo, the cost would be \$3.40/MW-day, which is just 3% of the average market-
15 based capacity price in the relevant zone for KPCo.¹⁵ The difference in capacity costs
16 for the different set of resources in the AEP and KPCo FRRs will certainly be greater

¹¹ Complaint of the Independent Market Monitor for PJM, Docket No. EL19-47-000.

¹² Baron Testimony, p.30.

¹³ <https://www.pjm.com/-/media/committees-groups/committees/mic/2020/20200415/20200415-item-08b-performance-assessment-event-settlement-paper-october-2019.ashx>.

¹⁴ Baron Testimony, Exh SJB-7.

¹⁵ The Rest of RTO zone averaged \$106.26/MW-day in the BRA over the past five Base Residual Auctions (BRAs).

1 than 3%. It is very possible that KPCo could meet its capacity obligation for a lower
2 cost than it pays to the AEP FRR even after accounting for performance risk insurance.

3 In addition, as Witness Baron correctly points out, FRR entities do not necessarily need
4 to pay penalties for underperformance of capacity resources. Instead, they can elect the
5 “physical” option in capacity performance and can make up for underperformance by
6 adding additional capacity in the following Delivery Year. This can reduce costs,
7 especially when capacity prices are low.

8 **Q. Why would bonus payment opportunities increase when KPCo leaves the AEP**
9 **East PCA?**

10 A. According to AEP, within the AEP FRR, “..the hypothetical scenario where one unit in
11 the FRR plan underperforms during a capacity performance interval and another unit
12 over-performs during the same capacity performance interval in an amount that offsets
13 the underperformance, the combined FRR plan and Operating Companies would not be
14 billed by PJM for a capacity performance charge.”¹⁶ While this performance “netting”
15 can be beneficial to underperforming resources, if the over-performing resource were
16 outside the AEP FRR it would have received a bonus payment. A smaller portfolio can
17 be better positioned to benefit from strong performance of individual resources.

¹⁶ Baron Testimony, Exh SJB-6.

1 **Q. The AG/KIUC intervenors suggest that KPCo should becoming a separate zone.**

2 **How would this impact the capacity costs for KPCo ratepayers?**

3 A. The Herling Testimony addresses the many challenges to such a designation being
4 feasible.¹⁷ Assuming it was feasible, the capacity cost impacts could range from minimal
5 to substantial. The impacts would be highly dependent on the outcome of an assessment
6 by PJM on transmission and capacity deliverability. The impacts would also be highly
7 influenced by the future capacity mix within the KPCo service territory and transmission
8 developments. Examples of impacts include a potential infeasibility for KPCo being an
9 FRR entity, price separation in the PJM Capacity Market, and high capacity cost
10 volatility and penalty risk.

11 **Q. Please expand briefly on each.**

12 A. The FRR infeasibility could be caused by a PJM determination that a high percentage
13 of capacity resources must come from within the KPCo zone, or Locational
14 Deliverability Area (LDA) as it would be called in the capacity construct. The PJM sets
15 a Percentage Internal Resources Required (PIRR) for each modeled LDA for each
16 delivery year. If that requirement for KPCo led to an in-zone requirement above total
17 installed capacity in the KPCo service area, KPCo would not be able to form a FRR
18 capacity plan without developing new capacity or transmission.

¹⁷ Herling Rebuttal Testimony, pp.5-6.

1 Price separation in the PJM Capacity Market means an LDA has a different capacity
2 price than other regions in the market. This happens when LDAs are transmission
3 constrained. Generally, prices separate higher in smaller zones, if at all. Smaller LDAs
4 can also see year-to-year price volatility from changes in PJM determinations of
5 transmission constraints and changes in the local capacity mix. Finally, smaller LDAs
6 can experience localized Capacity Performance events, possibly at a higher rate or for
7 greater durations than the broader PJM market.

8
9 **V. CONCLUSION**

10
11 **Q. What are your concluding remarks?**

12 A. Determining the optimal resource adequacy path for KPCo and its ratepayers is far more
13 nuanced, and features a far less certain outcome, than what either Mr. Baron or Mr.
14 Hoatson suggest in their testimonies. Recognizing this complexity and uncertainty is
15 important because decisions to seek the FRR alternative come with a five-year
16 commitment to remain an FRR entity, and decisions to terminate an existing FRR
17 election come with a five-year forfeiture of FRR eligibility. By entering the Bridge
18 PCA, KPCo has time to make the right decision informed by proper study.

19 While I disagree with many of Witness Hoatson's views on the likely outcome
20 of a study on FRR, I do agree that studying options is necessary. While I disagree with

1 Witness Baron's view that additional risks and costs are inevitable outside the AEP
2 FRR, I believe a KPCo capacity plan should address performance risk and costs. As I
3 understand it, Liberty intends to conduct a comprehensive review of all aspects of PJM
4 participation, including the method of meeting its capacity obligation and addressing
5 capacity performance risk and opportunity. I support this approach and encourage the
6 Commission to do so, as well.

7 **Q. Does this conclude your testimony?**

8 **A. Yes.**

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CASE NO. 2021-00481

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OF
JEFF PLEWES**

ON BEHALF OF

LIBERTY UTILITIES CO.

**CHARLES RIVER ASSOCIATES, INC.
WASHINGTON, DC**

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CASE NO. 2021-00481

EXHIBIT_(JP-1)

OF

JEFF PLEWES

Professional Qualifications

Of

Jeff Plewes

MBA, School of Management
Yale University

BS Finance,
University of Virginia

Jeff Plewes is a Principal in the Energy Practice of CRA. He specializes in the economic analysis of energy and environmental policy and electricity market design. He has worked with companies throughout the energy sector to help them understand the implications of public policies and regulations on their operations, assets, and investment decisions. Mr. Plewes has led projects for clients in each of the North American competitive electricity markets and for many regulated utility clients, including internationally. Broader areas of focus have included electricity and capacity market strategy, climate policy, resource adequacy, economic impact analysis, and renewable fuels policy. Mr. Plewes supports this work with quantitative analysis using advanced energy and economic modeling tools, both proprietary and third-party.

His recent work includes serving as an expert in litigation regarding electricity charges to a large commercial customer, leading a study of the economic impacts of an international regulation on marine fuels, authoring multiple papers on the economics of renewable fuels policy, analyzing energy and capacity market design concepts in several regional power markets, assessing damages in multiple energy litigation cases, and evaluating economic benefits of renewable energy and other infrastructure projects.

Experience

Of

Jeff Plewes

Charles River Associates, Inc. (2007 – Present)

Principal, Washington, DC

Electricity Market Design and Strategy

- For several large generators in the PJM market, developed value-maximizing bidding strategies for capacity auctions that included performance incentives for the first time. The approach included analysis of likely market outcomes and expectations for generator performance based on technical analysis of past availability.
- For a large solar and energy storage developer, led several studies on multiple capacity markets in the U.S. to determine participation requirements, offer strategies and likely capacity pricing outcomes.
- For a variety of market participants in the Northeastern power markets, supported testimony on capacity market changes, including changes in parameters and the introduction of performance incentives. Presented findings

to ISO-NE stakeholders and regularly led analyses for a coalition of generators in PJM.

- For a large Independent Power Producer, prepared testimony for submission to FERC on proposed changes to the PJM capacity market.
- For a developing country's electricity market regulator, prepared and delivered an in-person multi-day workshop on capacity market theory and design.
- For a New York merchant generation owner, analyzed the impact of market developments on capacity prices in NYISO.

Transmission and Renewables

- For a solar developer, evaluated capacity value opportunities in PJM, ISO-NE and NYISO. Evaluated the future capacity opportunities for battery storage.
- For a large Midwestern electric utility, calculated future transmission costs for several complex wind farm investments.
- For several power sector investors and renewable energy developers, evaluated Renewable Energy Credit (REC) prices.

Energy Litigation

- For a large technology infrastructure firm, served as an expert witness in litigation over electricity billings.

- For an ethanol market participant, evaluating damages in an EPA enforcement case.
- For a large generator, supported testimony on a multi-billion dollar litigation case regarding power plant environmental controls and sale-leaseback arrangements.
- For a major investment fund in Hong Kong, led analysis for the Industry Expert in a case involving a major solar manufacturing firm.
- For a large Canadian utility, evaluated a competitor's plant outage timing for potential market manipulation. Reviewed electricity market data to identify non-competitive behavior. The competitor was eventually disciplined by the regulator.
- For an oil and gas major, provided litigation support in an environmental matter. Led team of analysts in an expansive literature review on the subject of contingent valuation for damage estimates. Authored summaries of the state of the economics based on thousands of academic studies from around the world.
- For a different oil and gas major, provided litigation support in an environmental matter. Led team of analysts in determining market share in support of expert testimony regarding the client's liability.

Carbon Policy Analysis

- For Plug Power, led a study on the carbon intensity of hydrogen produced by electricity at multiple U.S. locations. This involved modeling of the power sector and evaluating emissions using multiple methods and assumptions about renewable energy colocation and contracts.
- For the New York Mayor's Office, analyzed the power sector options to meet specific emissions goals through advanced modelling of the Northeast US energy infrastructure under various scenarios. Provided advice on feasible and economic options for both local and imported electricity.
- Supported expert testimony before the US Senate on a national climate policy.
- For an international private equity fund, evaluated investment opportunities in the carbon offset market. Analyzed national and international policy scenarios and identified potential investment risks.

Economic Impact Analysis

- For Brookfield Renewable Partners, led the analysis of a variety of economic benefits for a proposed set of hydropower/wind/transmission investments in the Northeast. Authored a report on the benefits for submission in the Massachusetts Clean Energy RFP. Completed a similar set of studies for Brookfield's hydropower submissions in a Maine Clean Energy RFP.

- For a Midwest electric utility (NIPSCO), developed studies on the economic benefits of the state's transition to renewable energy and on individual solar projects. Provided testimony to the Indiana Utility Regulatory Commission.
- For a large Eastern US electric utility, led the economic analysis for the largest transmission line proposal since the advent of FERC Order 1000. Helped the company navigate the complexities of interstate and inter-RTO transmission. Created a testimony-quality analysis that examined electricity price, production cost, job and output impacts using power sector and input-output modelling.
- For a consortium of gas pipeline owners in the Northeast, evaluated the gas market, electricity market, and macroeconomic benefits of a proposed pipeline. Led the coordination and integration of three advanced models and the development of presentations and a report.
- For the owner of a gas fired power plant in New York City, filed testimony on the socioeconomic impacts of investing in a major repowering investment.
- For Pepco Holdings, evaluated the economic benefits of several major electric distribution infrastructure projects and programs in Maryland and Washington, DC.

- For a large mining and processing industry association, examined the national economic contributions of the industry and analyzed the economic impact of a proposed change in the federal mining royalty rate.
- For The Fertilizer Institute, developed an economic contribution analysis for the fertilizer manufacturing industry in the US. Performed data analysis using the IMPLAN input-output model and a variety of public data sets. Authored multiple reports that were published and reported on by several news organizations.
- For a large Independent Power Producer (NRG Energy), co-authored a report on the economic impact of resource adequacy issues in Texas. Conducted economic modeling of alternate generation capacity scenarios, one in which ERCOT adopts a capacity market and one where it remains energy-only. Evaluated impacts on the Texas economy.

Natural Gas and Oil

- For the Coalition for American Energy Security, authored a study on the economic impacts of U.S. compliance with IMO 2020, an international regulation limiting the sulfur content of marine fuels in international shipping. Led the research and analysis, which included advanced refinery and macroeconomic modeling.

- For Valero Energy and various other refiners, authored or co-authored a variety of studies on the economics of the Renewable Fuels Standard. Serving as primary economics expert for analyzing and publishing comments on policy proposals. The analysis has involved advanced econometrics and statistics.
- For a refining company, evaluated the pass-through of renewable fuel credit prices in a report for submission to the EPA.
- For an oil and gas major, conducted an analysis of financial impacts of carbon price volatility and crude price uncertainty on refining margins.
- For the creditors in a major energy sector bankruptcy proceeding, led the enhancement of CRA's gas production model, which will be used for evaluating gas prices in asset valuations going forward.
- For Dow Chemical, evaluated the comparative economics of exporting Liquefied Natural Gas (LNG) versus using the gas for domestic manufacturing. Co-authored a report that was well read in policy circles and throughout the industry. Presented findings at the Department of Energy.

Market and Growth Strategy

- For a developing country's State Owned Electric Utility, developed strategies as the client prepared for significant capital expenditures and international climate policy shifts. Developed a variety of reports for executives on subjects related

to generation technology, international climate policies, US partnership opportunities, credit rating implications of capital investments, and monetization of carbon reductions.

- For a Middle East power and water utility, evaluated growth opportunities, both domestic and international. Presented findings to executives and led a workshop on economic value creation.

Systems Management Engineering, Inc. (2003 – 2005)

Manager, Washington, DC

- Led team of high-level professionals in assessing business processes and technology of the White House, the Office of Management and Budget (OMB), the Council on Environmental Quality (CEQ) and the US Navy.

JPMorgan Chase (2002)

Consultant, New York, NY

- Managed the development testing of several releases of a proprietary, multi-asset trading system.

Acumen Solutions, Inc. (1999 – 2002)

Consultant, McLean, VA

- Participated in growing a start-up company into a profitable, 200+ person consulting firm. Consulted on a variety of engagements.

Expert Testimony

Of

Jeff Plewes

JURISDICTION	PROCEEDING	REPRESENTING	TOPIC
Indiana Utility Regulatory Commission	Expert Reports for Cause Nos. 45462, 45511, 45529	Northern Indiana Public Service Company (NIPSCO)	Solar Projects Filings
Minnesota Public Utilities Commission (MPUC)	Docket No. IP-6981/CN-17-306, WS-17-307, TL-17-308	NextEra Energy	Economic Impacts of a Wind Project
New York State Department of Public Service		Eastern Generation	Economic Impacts of a Natural Gas Plant Project
Supreme Court of the State of New York	Telx-New York, LLC v 60 Hudson Owner LLC	Plaintiff	Damages Expert on Electricity Billings
Public Utility Commission of Ohio	Expert Report (July 2014)	Dayton Power and Light	Fair Market Valuation of Ohio Solar Renewable Energy Credits

Publications & Media

Of

Jeff Plewes

Books and Book Chapters

- Burrows, Plewes, et al. “Do contingent valuation estimates of willingness to pay for non-use environmental goods pass the scope test with adequacy? A review of the evidence from empirical studies in the literature,” Chapter in Contingent Valuation of Environmental Goods, Edward Elgar Publishing, 2017.

Public Reports and Articles

- Plewes and Chang, “Economic Analysis of IMO 2020: The Benefits to the U.S. Economy of Full Participation and Compliance,” June 2019.
- Plewes, “Improving Outcomes of the Renewable Fuels Standard through a Price Containment Mechanism,” website of Fueling American Jobs Coalition, March 2018.
- “Unobligated RINs for Renewable Fuel Exports,” website of Fueling American Jobs Coalition, October 2017.
- Hunger, Plewes, and Kwok. “Navigating PJM’s Changing Capacity Market,” CRA Energy Practice White Paper, March 2017.

- “A Case Study in Capacity Market Design and Considerations for Alberta (MISO case study),” for Alberta Electric System Operator, March 2017.
- “Economic Contributions of Pepco’s Annual Distribution-Related Capital Expenditures in the District of Columbia,” for Pepco Holdings, Inc., December 2016.
- “Re-Examining the Pass-Through of RIN Prices to the Prices of Obligated Fuels,” Comments to EPA, October 2016. (Docket ID No. EPA-HQ-OAR-2016-0544-0067)
- “Economic Modeling of the Clean Power Plan,” Presentation at REMI Luncheon, Washington DC, August 2015.
- NYC Mayor’s Office, “New York City’s Pathways to Deep Carbon Reductions,” December 2013. (power sector sections only)
- Ditzel and Plewes, “US Manufacturing and LNG Exports: Economic Contributions to the US Economy and Impacts on US Natural Gas Prices,” EPA Comments for Dow Chemical, 2013.
- Plewes and Hieronymus, “Economic Impact of Inadequate Generation in ERCOT - Comparison of Resource Adequacy Scenarios.” submitted in PUCT proceedings, 2013.
- “Employment Contributions of an Expanded Undergrounding Program in Support of the Mayor’s Power Line Undergrounding Task Force,” for Pepco Holdings, Inc., February 2013.

- Plewes and Rankin, “Employment Contributions of the Medical Imaging Technology Industry,” June 2013.
- Plewes, “Economic Contributions of the U.S. Fertilizer Manufacturing Industry,” for The Fertilizer Institute, August 2009.

CRA Insights Articles

- Plewes, “US and EU commit to ambitious reductions in GHG emissions,” April 2021.
- Plewes and Kwok, “Initial thoughts on the winter 2021 power outages in Texas,” February 2021.
- Plewes and Kaineg, “Examining post-election climate policy scenarios in the US,” January 2021.
- Kwok, Plewes, et al., “PJM’s Capacity Market: Where are we now?,” October 2020.
- Kwok, Plewes, et al., “FERC directs PJM capacity market reforms: Progress but not certainty,” December 2019.
- Kwok and Plewes, “Addressing capacity performance risk for variable energy resources,” October 2019.
- Hunger, Plewes, and Kwok, “Navigating PJM’s Changing Capacity Market,” March 2017.

Speaking Engagements

Of

Jeff Plewes

- Moderator, South America Energy Series (SAES 2021), Panel on “Clean Transport, Future Fuels and Hydrogen,” April 2021.
- Presenter, CRA-Wright & Talisman Webinar, “Expectations of a Blue FERC: Climate Policy During the Biden Administration: Natural Gas Focus,” December 2020.
- Presenter, Energy Bar Association 2019 Northeast Chapter Annual Meeting, “State Policies and the Markets: How the tension is playing out in PJM, NYISO and ISO-NE.” June 2019.
- Presenter, Mid-Atlantic Power Market Summit, “Designing Optimal Capacity Market Offer Strategies,” October 2017.
- Presenter, “Clean Power Planning: Steps Utilities Should Be Taking Now To Engage State Leaders Around CPP Implementation,” January 2016.

