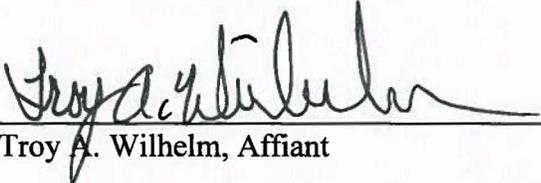


VERIFICATION

STATE OF OHIO)
)
COUNTY OF HAMILTON) **SS:**

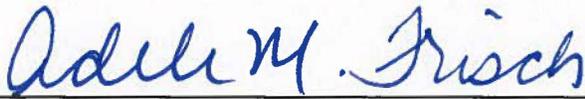
The undersigned, Troy A. Wilhelm, being duly sworn, deposes and says that he is the Manager Project Engineering and that he has personal knowledge of the matters set forth in the foregoing data requests, and that the answers contained therein are true and correct to the best of his knowledge, information and belief.



Troy A. Wilhelm, Affiant

Subscribed and sworn to before me by Troy A. Wilhelm, on this 24TH day of July, 2017.

ADELE M. FRISCH
Notary Public, State of Ohio
My Commission Expires 01-05-2019



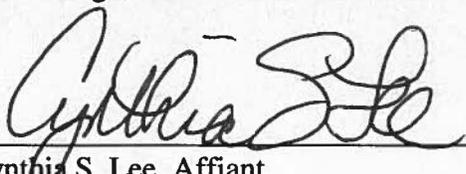
NOTARY PUBLIC

My Commission Expires: 1/5/2019

VERIFICATION

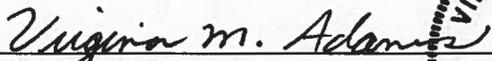
STATE OF NORTH CAROLINA)
)
COUNTY OF MECKLENBURG) **SS:**

The undersigned, Cynthia S. Lee, Director of Asset Accounting, being duly sworn, deposes and says that she has personal knowledge of the matters set forth in the foregoing data requests are true and correct to the best of her knowledge, information and belief.

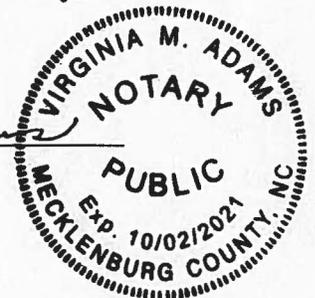


Cynthia S. Lee, Affiant

Subscribed and sworn to before me by Cynthia S. Lee on this 21 day of July, 2017.



NOTARY PUBLIC

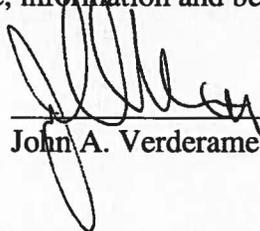


My Commission Expires:
Oct. 02, 2021

VERIFICATION

STATE OF NORTH CAROLINA)
) **SS:**
COUNTY OF MECKLENBURG)

The undersigned, John A. Verderame, Managing Direct – Power, Trading & Dispatch, being duly sworn, deposes and says that he has personal knowledge of the matters set forth in the foregoing data requests, and that the answers contained therein are true and correct to the best of his knowledge, information and belief.



John A. Verderame, Affiant

Subscribed and sworn to before me by John A. Verderame on this 19 day of July, 2017.

KATIE JAMIESON
Notary Public, North Carolina
Gaston County
My Commission Expires



NOTARY PUBLIC

My Commission Expires: June 14, 2021

KYPSC CASE NO. 2017-00186
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STAFF-DR-01-001

REQUEST:

Refer to the application, paragraph 12, regarding the higher PJM Interconnection LLC (“PJM”) Capacity Performance (“CP”) payments for the most reliable resources and higher non-performance assessments for assets that do not meet performance expectations.

- a. Assuming the Commission approves Duke Kentucky’s proposal to construct the new back-up ultra-low sulfur diesel distillate fuel oil system (“ULSD Fuel System”) at the Woodsdale Generating Station and that it is timely completed, provide a comparison of the current Delivery Year CP payments with those through the 2020/2021 Delivery Year broken down by the CP payments for the East Bend and Woodsdale Generating Stations.
- b. Assuming the Commission approves Duke Kentucky’s proposal, identify and explain the basis for any anticipated changes to other revenues (other than jurisdictional sales of electricity) from the Woodsdale Generating Station, including those for black-start capacity, ancillary services, and net off-system sales revenue, from the current Delivery Year through the 2020/2021 Delivery Year broken down by the other such revenues for the East Bend and Woodsdale Generating Stations.

- c. Explain how the higher CP payments for the most reliable resources are determined and the estimated impact they will have on the revenues generated from the Woodsdale Generating Station for the 2019/2020 and 2020/2021 Delivery Years, assuming they are reliable resources.

RESPONSE:

- a. Duke Energy Kentucky currently operates in the PJM market as a Fixed Resource Requirement entity (FRR). As such, resources dedicated to its FRR plan have not, and will not, receive capacity payments from PJM. Rather, that capacity serves as a direct offset to the PJM assigned Duke Energy Kentucky load obligation. There is a provision in the FRR construct for FRR entities, subject to minimum and excess capacity thresholds, to offer limited amounts of capacity that they may own in excess of their obligation; but Duke Kentucky has not sold generation into a PJM auction to date. In recent Delivery Years, with the exception of a brief period following the purchase of Dayton Power and Light's share of East Bend 2, the total capacity owned by Duke Energy Kentucky at East Bend and Woodsdale has generally just met its customer load obligation. As an FRR entity, Duke Energy Kentucky is exempt from Capacity Performance requirements until the start of the 2019 Delivery Year to allow additional time for FRR entities to transition to Capacity Performance. While exempt from the performance requirements and potential assessments, FRR entities are also precluded from eligibility to receive Capacity Performance bonus payments during the transition period. Duke Energy Kentucky would become eligible to receive Capacity Performance bonus payments based upon unit performance during a declared

event. The Company cannot predict the duration or extent of bonus payments such a possible future events.

- b. Duke Energy Kentucky does not anticipate that installation of the ULSD Fuel System will drive additional revenues from PJM. The installation of the ULSD Fuel System will allow the Company to continue to rely upon its existing assets once they meet the Capacity Performance standards. The Capacity Performance construct does however provide incentives for generators to perform above their committed capacity level in the form of bonus payments. The bonus payments are funded on a per CP event basis by assessments collected from generators that do not meet their obligations, and distributed to generators that perform above their committed capacity. To the extent that there is a natural gas deliverability constraint, Duke Energy Kentucky will utilize the ULSD Fuel System to meet its committed capacity obligation as an FRR and to potentially generate energy at levels above its obligation, thus becoming eligible for bonus payments.
- c. As described above. The opportunity for Woodsdale Station to generate additional revenue will be determined primarily through two factors, the number of CP compliance hours per year, and the performance of each individual Woodsdale unit during a compliance assessment hour. If a Woodsdale unit is dispatched by PJM during a compliance hour to its committed capacity level, and generates energy to that level, it will have met its obligation. If that unit is dispatched to a level above its committed capacity, and it generates any energy above its commitment, it will be eligible for a share of the collected assessments. If it fails to generate energy to its committed level, it will incur a performance assessment.

The actual capacity commitment of an individual unit is based on its historical performance and whether or not that capacity is required to meet the FRR plan. The historical performance is utilized to derive the unit's "Unforced Capacity" (UCAP). The UCAP is the level of capacity that any generator can offer into an auction or dedicate to an FRR plan. Generally, however, if the unit is available to run it will likely generate near, or in favorable ambient temperature conditions such as during winter, above its UCAP. It is extremely difficult to estimate what excess revenues to expect from CP bonus payments, and Duke Energy Kentucky does not consider the ULSD fuel system to be a revenue producing strategy. It is intended to improve reliability of the Woodsdale Station as a resource to meet Duke Energy Kentucky's native load obligation during periods of fuel scarcity, and to meet the requirements of a Capacity Performance resource and allow the Company to continue to rely upon the station capacity to satisfy its FRR plan. Over the extreme long run, if the units perform to their historical forced outage rates, and the distribution of CP event hours is in complete sympathy with those forced outages, we can expect that the units will only be subject to assessments up to the lower of their UCAP or committed amounts, but will be eligible for bonuses to their full generating capacity, thus potentially providing additional revenues for customers.

PERSON RESPONSIBLE: John Verderame

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

STAFF-DR-01-002

REQUEST:

Refer to the application, paragraphs 13 and 15, regarding the CP market changes. Also, refer to Case No. 2014-00078,¹ in which the Commission approved Duke Kentucky's accounting treatment for the sale of natural gas purchased for generation but not consumed and sold at a loss. What effects, if any, will the CP market changes have on mitigating or eliminating the scenario which gave rise to Case No. 2014-00078?

RESPONSE:

The CP market changes will not eliminate the scenario which gave rise to Case No. 2014-00078. Given the facts and circumstances in Case No. 2014-00078, Duke Energy Kentucky purchased gas so the Woodsdale units were available to be reliably dispatched given that these units cleared the PJM Day-Ahead Energy Market. Given the operational flow order (OFO) that was in effect on the pipeline at the time, Duke Energy Kentucky had to sell the gas it purchased to balance supply with plant usage as it could not have additional imbalances given the OFO and to avoid significant pipeline penalties. The CP market changes are a separate requirement that does not eliminate future OFOs or other circumstances that may result in the need for Duke Energy Kentucky to sell previously purchased natural gas to manage the units availability in the most reliable and economic

¹ Case No. 2014-00078, *An Investigation of Duke Energy Kentucky, Inc.'s Accounting Sale of Natural Gas not used in its Combustion Turbines* (Ky. PSC Nov. 25, 2014).

manner. Duke Energy Kentucky will offer its Woodsdale units using the fuel source that provides the most reliable and economic solution.

PERSON RESPONSIBLE: Joseph McCallister

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

**PUBLIC STAFF-DR-01-003
(As to Attachment only)**

REQUEST:

Refer to the application, paragraph 16, regarding Duke Kentucky's load obligation.

- a. Provide a comparison of Duke Kentucky's summer and winter generation capacity to its actual and forecasted summer and winter peak load obligations, including its PJM reserve margin, for the 2015/2016 Delivery Year through the 2020/2021 Delivery Year.
- b. Explain how, if at all, the proposed ULSD Fuel System will affect the summer and winter generation capacity at the Woodsdale Generating Station.

RESPONSE:

CONFIDENTIAL PROPRIETARY TRADE SECRET (As to Attachment only)

- a. PJM does not assign load obligation seasonally, but rather determines a single peak load obligation inclusive of reserve margin. See Confidential Attachment Staff DR-01-003 (which is being filed under a Petition for Confidential Treatment) for Duke Kentucky's net unforced capacity, consisting of generation, demand response resources, and capacity sales and purchases, compared to forecasted actual and known actual peak load obligations, including its PJM reserve margin, for the 2015/2016 Delivery Year through the 2020/2021 Delivery Year. For this comparison, the forecasted obligation is that assigned by PJM at the time of the submittal of its initial FRR plan three years prior to the delivery year,

and the actual obligation is that assigned by PJM at the submittal of its final FRR plan just before the delivery year.

- b. Duke Energy Kentucky does not expect that the ULSD Fuel System will affect the summer and winter generation capacity at the Woodsdale Generating Station.

PERSON RESPONSIBLE: John Verderame

**STAFF-DR-01-003
CONFIDENTIAL
ATTACHMENT IS
BEING PROVIDED
UNDER THE SEAL
OF A PETITION
FOR
CONFIDENTIAL
TREATMENT**

REQUEST:

Refer to the application, paragraph 19, regarding the retirement and demolition of the existing propane secondary fuel system.

- a. When was Duke Kentucky's last depreciation study conducted?
- b. Did the depreciation rates developed for the assets in the existing propane secondary fuel system consider the impact of the cost-of-removal and salvage value (net salvage value)?
- c. If the answer to part b. above is affirmative, explain how, if at all, the depreciation rates affected the \$55.4 million cost of the proposed project.
- d. What impact will the proposed project have on the useful life of the units at the Woodsdale Generating Station?

RESPONSE:

- a. Duke Energy Kentucky's last depreciation study submitted as part of a rate case was completed on electric and common plant asset balances as of December 31, 2005. The rates from the study were implemented on January 1, 2007. The Company's most recently filed depreciation study was submitted to the Commission on December 11, 2013 in Case No. 2006-00172 for informational purposes.

- b. Yes, the depreciation rates developed in the study included estimates for net salvage.
- c. The \$55.4 million cost of the proposed project included cost-of-removal costs of \$1,899,976 and gross salvage value of \$61,969, resulting in an estimated net salvage value of \$1,838,007. The cost-of-removal and gross salvage amounts for the project will be appropriately charged to RWIP/Cost of Removal and Salvage Reserves, respectively, in Account 108.
- d. The proposed project does not impact the useful life of the units at the Woodsdale Generating Station.

PERSON RESPONSIBLE: Cynthia S. Lee

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

STAFF-DR-01-005

REQUEST:

Refer to the application, Exhibit 5, page 13 of 106. With respect to a "Capacity Performance (CP) penalty period," explain why CP periods typically occur during the winter rather than during the summer. For the prior three Delivery Years, provide the days which would have been considered as a CP period.

RESPONSE:

With all other factors held equal, the potential impact on equipment and fuel availability from weather events during winter temperatures could tend to drive higher CP event risk during winter months. During the Polar Vortex of 2014, the primary drivers behind forced outages were frozen components at power plants and natural gas delivery interruptions or restrictions.

There have been no CP assessment hours during the prior three Delivery Years. The most recent conditions that would have triggered CP events occurred during the 2013/2014 Delivery Year:

- July 18, 2013 (4 hours)
- January 6 – 8, 2014 (20 hours)
- January 30, 2014 (2 hours)
- March 4, 2014 (4 hours)

PERSON RESPONSIBLE: John Verderame

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

STAFF-DR-01-006

REQUEST:

Refer to the Direct Testimony of Joseph A. Miller, Jr., pages 12-13, where he states that the installation of fuel oil combustion hardware on the units at the Woodsdale Generating Station will not trigger the need for any significant construction-related permits. Identify any other needed construction-related permits and provide the status of such permits. Consider this an ongoing request to be updated throughout the duration of this proceeding.

RESPONSE: Please see direct testimony of Andrew Roebel regarding the construction-related permits in his direct testimony on pages 5-7. The Company recently submitted a minor construction permit modification to the Ohio EPA for installation of the two fuel oil tanks with a fixed roof design instead of the original floating roof design. The Company will keep the Commission updated on the status of any permit modifications and will file revised permits once received.

PERSON RESPONSIBLE: Troy Wilhelm

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

**PUBLIC STAFF-DR-01-007
(As to Attachment only)**

REQUEST:

Refer to the Direct Testimony of John A. Verderame (“Verderame Testimony”), page 12, lines 18-23. Provide a copy of Duke Kentucky’s preliminary FRR plans for the 2019-2020 and 2020-2021 Delivery Years.

RESPONSE:

CONFIDENTIAL PROPRIETARY TRADE SECRET (As to Attachment only)

Please see CONFIDENTIAL ATTACHMENT STAFF-DR-01-007, which is being filed under a Petition for Confidential Treatment.

PERSON RESPONSIBLE: John Verderame

**STAFF-DR-01-007
CONFIDENTIAL
ATTACHMENT IS
BEING PROVIDED
UNDER THE SEAL
OF A PETITION
FOR
CONFIDENTIAL
TREATMENT**

REQUEST:

Refer to Verderame Testimony, page 13, lines 13-18. Explain what types of “supporting data and information” could be requested of Duke Kentucky by PJM or the Independent Market Monitor (“IMM”) to evaluate whether the Woodsdale Generating Station can meet the operational and performance requirements of Capacity Performance Resources.

RESPONSE:

While PJM has not specifically identified requirements necessary for a generator to be deemed to have met the fundamental attributes of a Capacity Performance resource, it has identified a fundamental requirement that resources be available under all circumstances to provide committed generation during emergency conditions. As a practical matter, PJM or the IMM may, or may not, insist on proof of compliance prior to acceptance of a resource. As cited from the PJM Tariff in the direct testimony of Mr. Verderame, PJM and the IMM retain rights to assure themselves that resources committed to the market can meet Capacity Performance requirements. It is Duke Energy Kentucky’s understanding that fuel certainty is one of the fundamental attributes of a CP resource. As such, the Company interprets the tariff that at a minimum, if requested, it would be expected to provide evidence of such fuel certainty, including evidence of either contractual Firm Gas Transportation or the existence of a dual fuel capability plan. Given the broad nature of the tariff language, it is also possible that either the IMM or PJM

could request information on capability testing and any projects undertaken with the goal of increasing performance reliability.

PERSON RESPONSIBLE: John Verderame

REQUEST:

Refer to Verderame Testimony, pages 13-14, regarding the broad discretion provided to PJM and the IMM to challenge generators as being Capacity Performance compliant.

- a. Explain in detail the process by which either PJM or the IMM would exercise its authority to challenge a generation resource's compliance with the CP requirements.
- b. Is Duke Kentucky aware of any generation resource that has been challenged by PJM or the IMM as not compliant with the CP requirements?

RESPONSE:

- a. The following is excerpted from the PJM Tariff Attachment DD Section 5.5A(a)i
 - i) *Process for Support and Review of Capacity Performance Resource Offers*
 - A. *The Capacity Market Seller shall provide to the Office of the Interconnection and the Market Monitoring Unit, upon their request, all supporting data and information requested by either the Office of the Interconnection or the Market Monitoring Unit to evaluate whether the underlying Capacity Resource can meet the operational and performance requirements of Capacity Performance Resources. The Capacity Market Seller shall have an ongoing obligation through the closing of the offer*

period for the RPM Auction to update the request to reflect any material changes.

B. The Office of the Interconnection and the Market Monitoring Unit shall review any requested supporting data and information, and the Office of the Interconnection, considering advice and recommendation from the Market Monitoring Unit, shall reject a request for a resource to offer as a Capacity Performance Resource if the Capacity Market Seller does not demonstrate that it can reasonably be expected to meet its Capacity Performance obligations consistent with the resource's offer by the relevant Delivery Year. The Office of Interconnection shall provide its determination to reject eligibility of the resource as a Capacity Performance Resource, and notify the Market Monitoring Unit, by no later than sixty-five (65) days prior to the date on which the offer period for the applicable RPM Auction commences. A Capacity Market Seller that is dissatisfied with any determination hereunder may seek any remedies available to it from FERC; provided, however, that the Office of the Interconnection will proceed with administration of the Tariff and market rules unless and until ordered to do otherwise by FERC.

b. Duke Energy Kentucky is not aware of specific resources that have been challenged by either PJM or the Independent Market Monitor to date. It is likely that such a challenge would be done confidentially unless the market participant were to be formally referred to the FERC Department of Enforcement for investigation of violation of the PJM tariff. Anecdotally, while PJM has indicated

that it has challenged resources to provide information supporting ability to meet CP performance requirements, it has not rejected a resource from participation in the capacity market.

The following is excerpted from the FERC order approving the Capacity Performance construct supporting the breadth of PJM and IMM discretion:

For the reasons discussed below, we accept, subject to conditions, PJM's proposal addressing the performance requirements and expectations applicable to Capacity Performance Resources.

We find that PJM's proposed mechanism for reviewing and, when appropriate, rejecting a sell offer is just and reasonable, subject to PJM removing the phrase "to the satisfaction of the Office of the Interconnection" from proposed section 5.5A(ii)(B) of Attachment DD. PJM's existing tariff gives PJM the authority to reject a seller offer, as applicable to a capacity resource.^[1] We find that this same authority is generally appropriate in the case of a Capacity Performance Resource offer, given that it will enable PJM to reject offers from resources that: (I) cannot reasonably be relied on to perform, as required, during emergency conditions; (ii) are purely speculative; or (iii) would otherwise undermine the intent of PJM's Capacity Performance construct. We also accept PJM's commitment to modify this provision, so that PJM will only reject an offer when a resource fails to demonstrate that it can reasonably be expected to

^[1] See PJM OATT at Attachment DD, sections 5.6.6 and 5.8(i).

meet Capacity Performance obligations consistent with the resource's offer by the relevant delivery year.

151 FERC ¶ 61,208 Paragraph 92, available at

<https://elibrary.ferc.gov/idmws/common/opennat.asp?fileID=13899457>

PERSON RESPONSIBLE: John Verderame

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

STAFF-DR-01-010

REQUEST:

Refer to Verderame Testimony, page 14, lines 18-20. Explain in detail the “asset hardening” strategies that are being implemented at the East Bend Generating Station and how this strategy will reduce the frequency and duration of forced outages. Explain also whether a hardening strategy was considered for the Woodsdale Generating Station as part of its CP-compliance evaluation.

RESPONSE:

As a result of the Company’s CP-compliance evaluation, it has concentrated its focus on reliability driven projects which in turn will help reduce the frequency and duration of forced outages. This focus includes projects targeted at addressing current performance degraders at East Bend Generating Station such as particular boiler tube sections, tube headers, and turbine components. For Woodsdale Generating Station, projects have been identified that will increase the starting reliability of the units, in particular related to the static frequency convertors.

PERSON RESPONSIBLE: Joseph A. Miller

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

STAFF-DR-01-011

REQUEST:

Refer to Verderame Testimony, page 15, lines 4-6. Other than fuel certainty, explain what other factors would be considered by PJM to be a minimum requirement to meet Capacity Performance expectations.

RESPONSE:

PJM has intentionally avoided prescription or proscription in establishing minimum requirements to meet Capacity Performance expectation, preferring instead to allow market drivers and market risk realities drive innovation. Beyond the fundamental 'no excuses' requirement that resources be available to meet system reliability needs whenever PJM demands, there is no definitive set of reliability metrics or necessities. While PJM has deferred from listing requirements, actions and investments made by market participants currently subject to CP requirements can provide some insight into generation owner considerations of minimum requirements. In October of 2016, PJM published the results of an incomplete survey describing the types of investments being made by generators specifically to meet CP performance requirements. Those investments ranged from relatively modest investments such as staffing augmentation to major capital investment projects with budgets exceeding \$100 million. The report is included in STAFF-DR-01-011 Attachment.

PERSON RESPONSIBLE: John Verderame

Capacity Performance Driven Investments

Capacity Performance incorporates strong performance incentives to ensure operational availability and flexibility of resources especially during peak conditions. In 2015, new Capacity Performance rules were used in the three-year forward capacity auction as well as two transition auctions in preparation for the June 1, 2016 effective date. PJM is soliciting information from generation owners with resources committed as Capacity Performance resources for the 2016/2017 delivery year to better understand investment decisions anticipating the enhanced operational performance requirements. PJM has committed to assess the 2016/2017 Capacity Performance transition year; the investment information is one element of the assessment PJM will complete after the conclusion of the winter season experience under the new rules.

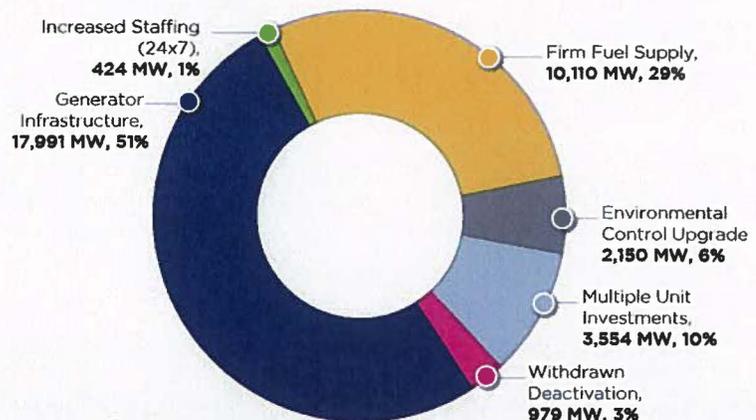
To date, PJM has surveyed 100 units or approximately 62,000 MW of the 93,000 MW of total committed Capacity Performance for the 2016/2017 delivery year. Though the survey is not complete, early indication is that units are investing in a variety of different ways, summarized below, to improve their reliability and flexibility. PJM will continue to collect data on Capacity Performance related investments as an increasing number of units will need to comply by the delivery year 2020/2021, when 100 percent Capacity Performance compliance is required.

Generator Investments

Generation companies are making generator-specific investments in staffing, infrastructure, and fuel supply.

Increased Staffing: Some companies are planning to staff their generators 24x7 to ensure unit readiness and decrease notification time. To put this into perspective, the annual per station investment can range from \$500,000 - \$3,000,000 depending on staff size¹.

Generator Infrastructure: Generation companies are investing more in long-term maintenance to ensure the longevity of their generators through major upgrades, such as boiler work, condenser replacements, and installation of new equipment. Companies have reported budgets ranging from \$1.5M for winterization projects to upwards of \$100M for major unit overhaul upgrades.



¹ Investment amount assumes a range of 5 - 23 additional employees hired to staff the station.

Capacity Performance Driven Investments

Firm Fuel Supply: Firming-up fuel supply has been another investment for gas generators. Gas generators are procuring firm and/or no-notice transportation services where available. Firm pipeline capacity is typically not readily available as it is contracted to interstate pipelines year-round. When it is available it is generally the most expensive option. For this reason, some companies with dual fuel capability are installing on-site oil storage tanks to firm-up fuel supply. This allows the generator to run on oil when natural gas pipelines are constrained. There are multiple confirmed generators that are in the process of upgrading from single fuel to dual fuel. Generation companies have budgeted from \$30M to over \$100M for this conversion.

Environmental Investments

In recent years, environmental policies have caused some units to limit output or retire altogether. Capacity Performance incentives have driven investments by generation owners to increase run-time capability while complying with environmental rules. According to these generation owners, revenue from Capacity Performance has made it economical to install emissions controls on their units to optimize megawatt-hour output while staying within emissions limits. The average capital cost to install environmental control technology is \$32 million².

Withdrawn Generator Deactivation

Over the last five years in PJM, a total of 215 generating units deactivated, totaling 24,979 MW of capacity. Since the implementation of Capacity Performance, 1,224 MW of generating capacity that previously planned to deactivate, have withdrawn their requests as a result of sustainable market conditions, 979 MW of which received a Capacity Performance commitment.

Gas Market Product /Service Innovation

Flexible Demand: In 2015, both the Kinder Morgan Pipeline and Spectra Pipeline proposed infrastructure expansion projects from the Marcellus Shale region to the New England market. Both projects were specifically targeted at the gas generation market with provisions to offer firm capacity and no-notice hourly gas flow flexibility; operating characteristics increasingly required of the gas generation industry, particularly in capacity constrained New England. Unfortunately, significant state and local opposition to these projects, combined with their relatively expensive costs, has forced the pipelines to reconsider. Earlier this summer, Kinder Morgan officially pulled their filing and suspended their project pending internal reconsideration. The Spectra Project, while not canceled yet, continues to run into state roadblocks from a cost recovery standpoint as well as considerable NIMBY and NOPE opposition. The need for pipeline services designed for the unique needs of the growing gas fired generator market is clearly evident and is something that PJM will continue to monitor and advocate where and when appropriate. The Capacity

² These costs include control technologies for environmental rules estimated to be incurred by 2019. NOx control, SO₂ control, coal ash disposal, wastewater treatment upgrades, and cooling water intake upgrades. Fuel types affected: coal, natural gas, and oil.

Capacity Performance Driven Investments

Performance initiative is intended to spur more of these service offerings as demand from the generation market increases.

Infrastructure: A number of mid-stream pipeline projects in the PJM region are currently before the Federal Energy Regulatory Commission for review. There have been numerous delays with these projects due to significant local opposition from environmental groups and landowners not wanting pipelines near their properties. These projects are designed to alleviate the bottleneck in the Utica and Marcellus shale regions where there is a vast supply and production of low-cost natural gas but not nearly enough take-away pipeline capacity to transport it to the Midwest, mid-Atlantic, Northeast and Southeast regions of the U.S. These mid-stream projects are being developed by a variety of companies including several large interstate pipeline companies as well as partnerships between gas producers and local pipeline marketing companies. Once approved and built, these projects will improve overall gas availability across the entire eastern half of the U.S.

Liquefied Natural Gas: On-site Liquefied Natural Gas storage is in the early stages of being marketed to generators as a means of a backup and/or supplemental fuel alternative. LNG storage is capable of supplementing and in some cases, replacing on a short term basis, natural gas delivered from the interstate pipeline without taking the unit offline. LNG storage companies have identified the potential opportunity Capacity Performance offers to provide gas fired generators with a reliable back up fuel supply. Some rough estimates have priced the on-site LNG alternative at approximately \$8/MWh. PJM has invited two LNG development companies into our office to discuss these opportunities and has one additional LNG company scheduled in October to present their service offerings. LNG, in some cases, may provide a much better alternative to oil in terms of availability and environmental impact from emission limitations.

PJM is in the early phase of capturing generator owner investments spurred by Capacity Performance availability and flexible operation requirements. This effort will continue throughout the year and the information collected will be included in PJM's assessment of the 2016/2017 Capacity Performance transition year assessment provided in spring 2017.

STAFF-DR-01-012

REQUEST:

Refer to Verderame Testimony, page 16, lines 16-22. Explain whether gas supply to the Woodsdale Generating Station has been interrupted in the last ten years either during a Duke Kentucky-system peak period or a PJM-system peak period.

RESPONSE:

To the Company's knowledge, there have not been any gas supply interruptions at the Woodsdale Station in the last ten years, but there have been other supply constraints experienced. There have been periods of high demand on the pipeline which can make it more difficult to procure spot and intraday delivered supply which can limit the number of hours that the units may be able to run on natural gas. During periods of high demand, the pipeline can institute Operational Flow Orders (OFO's) per their tariff to limit shipper ability to consume more gas than procured. With less flexibility on the pipeline during OFO's and tighter market conditions, there is risk as to whether delivered natural gas supply can be procured in the spot and intraday gas markets to supply the station if PJM called for the units. If PJM were to commit and dispatch the Woodsdale units, and natural gas supply could not be procured, without a dual fuel back up the units could not meet that obligation and would be subject to performance assessments. In addition, there have been changes in the directional flows on the pipeline given the growth in shale gas in the region. Changing pipeline dynamics which have increased the north to south flows versus

historical south to north flows, there have been instances where lower pressures have been observed creating additional risk of not being able to support the hourly fuel requirements to operate the Wooddale units. Duke Energy Kentucky has experienced periods of low gas pressure at the Wooddale station that has forced units offline. If PJM had been in an emergency condition and had declared a Capacity Performance compliance hour, customers would have been exposed to performance assessments.

PERSON RESPONSIBLE: Joe McCallister/
John Verderame

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

STAFF-DR-01-013

REQUEST:

Refer to Verderame Testimony, page 17, lines 2-6. Provide the annual capacity factors for the Woodsdale Generating Station and for each unit for each of the past five years.

RESPONSE:

2012-2016 Annual Woodsdale Units 1-6 Net Capacity Factor (%)

Year	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Station
2012	0.32	0.31	0.48	0.11	0.12	0.00	0.22
2013	0.03	0.09	0.18	0.03	0.07	0.06	0.08
2014	0.30	0.31	0.29	0.30	0.36	0.38	0.32
2015	0.99	1.30	1.36	0.69	1.15	0.87	1.06
2016	0.64	0.73	0.66	0.54	0.62	0.69	0.65
2012-2016	0.46	0.55	0.59	0.34	0.46	0.40	0.47

PERSON RESPONSIBLE: John Swez

REQUEST:

Refer to Verderame Testimony, page 25, regarding the alternative CP compliance strategies that were considered for the Woodsdale Generating Station.

- a. Were there net present value estimates for each of the alternative strategies?
- b. If the answer to part a. is affirmative, provide the information relative to each strategy.
- c. If the answer to part a. is negative, explain why Duke Kentucky did not perform net present value calculations.
- d. If net present value calculations were not performed, explain how Duke Kentucky determined the proposed ULSD Fuel System was the less expensive alternative in the longer term.
- e. To the extent possible, for each strategy, provide the capital cost, the annual fuel cost, and the annual variable cost.

RESPONSE:

CONFIDENTIAL PROPRIETARY TRADE SECRET

- a. The Company did not perform an NPV analysis for each of the alternatives. The Kepner Tregoe (KT) decision analysis is intended to identify a problem condition, attendant risks, and the possible solutions, however unlikely or impractical; then further narrow the scope of solutions to most effectively

address the problem and mitigate those risks. High level cost estimates were performed for most of the alternatives where such quantification was possible or when estimated costs were believed to be comparable to alternatives with known costs of the benchmark alternatives. Firm transportation and dual fuel strategies were identified as the most likely, reasonable, and executable strategies. Logically, dual fuel and firm gas became the benchmark alternatives. cursory calculations were performed during the analysis, but no formal NPV analysis was deemed necessary for many of the alternatives identified because those alternatives were determined by the team to be impractical from either an operational or executable standpoint or did not sufficiently reduce the identified risks. Ultimately, the Company's analysis focused on those solutions that were effective, practical and cost effective at a high level of estimation.

- b. See part e below for a summary analysis.
- c. Net present value can be an effective part of an analysis when the nominal cost of alternatives is relatively close and the discounted nature of future costs can impact an alternative's relative merit. As described in Mr. Verderame's direct testimony, in this particular instance, the alternative strategies to meet the Capacity Performance requirements were either deemed insufficient from a risk mitigation perspective, were operationally onerous, presented significant hurdles in terms of timely execution, or were so disparate on a nominal cost basis as to make a net present value calculation irrelevant for most of the identified solutions.

d. More formal net present value comparisons of the ULSD fuel system and the Firm natural gas transportation options are provided in Confidential Attachment STAFF-DR-01-014, which is being filed under a Petition for Confidential Treatment.

e. The table below describes the expected or estimated costs (quantifiable and unquantifiable) ascribed to the alternatives evaluated.

Strategy	[REDACTED]	[REDACTED]	[REDACTED]
Exit PJM- Move DEK back to MISO with transmission build	[REDACTED]	[REDACTED]	[REDACTED]
Exit PJM- Move DEK back to MISO through pseudo tie	[REDACTED]	[REDACTED]	[REDACTED]

<p>Exit PJM- DEK becomes separate Balancing Authority</p>			
<p>Pseudo tie Woodsdale to MISO- Leave FRR-Purchase replacement capacity from PJM</p>			

Purchase Firm gas transportation			
Redundant Interruptible gas transport			
Refurbish existing propane system/Expansion or onsite storage.			
Refurbish existing propane system and Todhunter storage cavern			
Establish ethane pipeline connection retrofit burners			
Onsite ULS fuel oil system-burners retrofit			

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PERSON RESPONSIBLE: John Verderame

REQUEST:

Refer to Verderame Testimony, page 30, footnote 11. Provide an update to the status of this appeal and consider this an ongoing request to be updated throughout the duration of this proceeding.

RESPONSE:

Duke Energy Kentucky, along with its parent Duke Energy Ohio have been involved with litigation against MISO and MISO transmission owners, challenging MISO's ability to charge the companies with a share of a particular category of transmission expansion costs referred to as multi-value projects (MVPs). These MVPs were approved by MISO just weeks before the companies officially left MISO and joined PJM, and years after the two companies announced their intent to leave MISO. Duke Energy Kentucky and Duke Energy Ohio have rigorously and successfully challenged MISO's attempts to saddle the companies with these unreasonable costs at both FERC and in the federal courts.

On June 21, 2017, the United States Appeal Court upheld a FERC decision that denied MISO's ability to charge Duke Energy Kentucky for the MVP projects MISO approved after the Company announced its departure.^[1] Although Duke Energy Kentucky will continue to be charged for MTEP projects approved before its departure from MISO, the Appeals Court decision virtually assures that Duke Energy Kentucky will not be charged for the MVP. MISO could seek an *en banc* review (review by all

^[1] *Miso Transmission Owners v. FERC*, 2017 U.S. App. LEXIS 10961 (6th Cir. June 21, 2017).

justices on the appeals court) or an appeal to the United States Supreme Court but, even if it does so, the Company does not expect any change in the result.

PERSON RESPONSIBLE: Legal

**Duke Energy Kentucky
Case No. 2017-00186
Staff First Set Data Requests
Date Received: July 14, 2017**

**PUBLIC STAFF-DR-01-016
(As to Attachments only)**

REQUEST:

Refer to Verderame Testimony, Confidential Exhibit JV-1. Provide any and all supporting work papers and documents associated with the development of the Kepner-Tregoe Decision Matrix used by Duke Kentucky to evaluate the various compliance strategies for the Woodsdale Generating Station.

RESPONSE:

CONFIDENTIAL PROPRIETARY TRADE SECRET (As to Attachments)

Objection. This request seeks information that is subject to protection under the doctrines of attorney client privilege and work product. Without waiving said objection, please see Confidential Attachment JV-1 to Direct Testimony of John Verderame. See Non-privileged Confidential Attachments STAFF-DR-01-016(a) through (e), which is being filed under a Petition for Confidential Treatment.

PERSON RESPONSIBLE: As to Objection- Legal
John Verderame

STAFF-DR-01-016
CONFIDENTIAL
ATTACHMENTS (a)
through (g) IS BEING
PROVIDED UNDER
THE SEAL OF A
PETITION FOR
CONFIDENTIAL
TREATMENT