BEFORE THE
PUBLIC UTILITIES COMMISSION OF OHIO

In the Matter of the Review of the Power Purchase Agreement Rider of Ohio Power Company for 2018.	Case No. 18-1004-EL-RDR
In the Matter of the Review of the Power Purchase Agreement Rider of Ohio Power Company for 2019.	Case No. 18-1759-EL-RDR

Direct Testimony
of
Jeremy I. Fisher, PhD

On Behalf of
Natural Resources Defense Council

Public Version

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1. INTRODUCTION AND PURPOSE OF TESTIMONY

Q Please state your name, business address, and position.

A My name is Jeremy I. Fisher. I am a Senior Strategic and Technical Advisor at Sierra Club. My business address is 2101 Webster Street, Oakland, California, 94612. I am testifying in this case on behalf of Natural Resources Defense Council.

Q Please describe your role at Sierra Club.

A My role at Sierra Club is to provide an expert viewpoint on energy systems economics, emerging electric sector issues, and provide technical review of policy matters with which Sierra Club engages, including electricity system resource planning and public utilities regulation.

Q Please summarize your work experience and educational background.

A Prior to joining Sierra Club at the end of 2017, I was employed as a Principal Associate at Synapse Energy Economics, where I worked on electricity systems issues for a decade. At Synapse, I evaluated and helped to shape resource planning efforts, engaged in electric sector planning on behalf of states and municipalities, helped regulators navigate environmental rules, and assisted states in crafting or revising resource planning rules. In addition, I led the resource planning group at Synapse, which engages in the assessment of planning processes across a wide cohort of states and regions.

While at Synapse, I provided services for a wide variety of government and public interest clients, including the U.S. Environmental Protection Agency ("EPA"); the National Association of Regulatory Utility Commissioners; the National Association of State Utility Consumer Advocates; the National Rural Electric Cooperative Association; the respective energy offices and public utility commissions of Alaska, Arkansas, Michigan, and Utah, the Commonwealth of Puerto Rico; the Tennessee Valley Authority Office of Inspector General; the

California Division of Ratepayer Advocates; the California Energy Commission; the Regulatory Assistance Project; and various environmental public interest groups, including Sierra Club.

As a consultant, I provided training to federal regulators on resource planning practice and issues. I also led an intensive statewide planning process on behalf of the Michigan Public Service Commission to determine strategies for compliance with EPA's Clean Power Plan. Further, I worked on behalf of the Puerto Rico Energy Commission to develop state-of-the-art integrated resource plan ("IRP") rules, lead the evaluation of the island's first IRP, and audit the public utility in a first-ever rate case.

I have provided testimony in electricity planning and general rate case dockets in California, Georgia, Idaho, Indiana, Kansas, Kentucky, Louisiana, Michigan, Nevada, New Mexico, Ohio, Oklahoma, Oregon, Puerto Rico, Utah, Washington, Wisconsin, and Wyoming.

I hold a doctorate in Geological Sciences from Brown University, and I received my bachelor's degrees from University of Maryland in Geology and Geography.

My *curriculum vitae* is attached as Exhibit JIF-1.

Q Have you previously testified before the Public Utilities Commission of Ohio?

A Yes. I appeared before the Public Utilities Commission of Ohio ("PUCO" or "Commission") in Case 17-32-EL-AIR, Duke Energy Ohio's request to include into retail rates the costs of the Ohio Valley Electric Corporation ("OVEC") contract. In that case, I submitted testimony on behalf of Sierra Club.

Q What is the purpose of your testimony?

A My testimony reviews the participation of Ohio Power Company ("AEP Ohio" or "Company") in OVEC, as provided in PUCO docket 14-1693-EL-RDR. In that docket, the Commission established an annual audit of AEP Ohio's participation in the OVEC contract, known as the Intercompany Power Agreement ("ICPA").

The audit of AEP Ohio's participation in 2018 and 2019 was conducted by London Economics ("LEI" or "Auditor"), and published in this docket in September 2020.

My testimony examines the value of the ICPA to AEP Ohio's customers, as reviewed by the Auditor, and assesses the Auditor's characterization of OVEC's costs. In addition, I assess if the OVEC contract has served the best interests of AEP Ohio's customers, and if various information provided to the Auditor by AEP Ohio was accurate or complete.

Q What is the purpose of the audit?

A In authorizing OVEC's costs to be passed through to ratepayers, the Commission required that OVEC's costs and operations be scrutinized on an annual basis to assess if AEP Ohio has prudently administered OVEC costs.

Q What is AEP Ohio's relationship to OVEC?

A AEP Ohio is one of thirteen Sponsoring Companies (or "Sponsors") of OVEC, each of which pays for, and receives, a share of OVEC's energy and capacity.[1] AEP Ohio holds the largest share of the OVEC contract at 19.93 percent. However, together with American Electric Power Co. ("AEP") companies Appalachian Power Company and Indiana Michigan Power Company, AEP holds nearly half of the OVEC participation shares at 43.47 percent (see Figure 1, below).

[1] OVEC 2020 Annual Report. Page 1. Available online at https://www.ovec.com/FinancialStatements/AnnualReport-2020-Signed.pdf

Figure 1. Power participation ratio shares of Sponsoring Companies, by parent company.[2]

AEP Ohio is more than just an off-taker of the OVEC contract, however. The Michigan Public Service Commission ("MPSC") recently identified AEP as an affiliate of OVEC because of the deep ties between the entities.[3] AEP leaders serve on the boards of OVEC, its staff provide a wide range of operational services to OVEC, it exercises input and influence into operations, finance, and capital decisions at OVEC, and is identified as a shareholder of OVEC. Paul Chodak III, AEP's Executive Vice President of Generation currently serves as the President of OVEC and Indiana Kentucky Electric Corporation ("IKEC"), which is OVEC's wholly owned subsidiary that operates OVEC's Clifty Creek plant. Dr. Chodak was elected as a director of both companies, effective January 2019, and

[2] OVEC 2020 Annual Report. Page 1. Available online at https://www.ovec.com/FinancialStatements/AnnualReport-2020-Signed.pdf

[3] Michigan Public Service Commission, Docket U-20804, Order filed November 18, 2021, page 13. Attached as Exhibit JIF-2.

is touted by AEP as holding specific oversight responsibilities at OVEC.[4] Under the ICPA, AEP holds a position on the Operating Committee of OVEC, which oversees power delivery scheduling, energy and power accounting, and makes recommendations to the Board with respect to "other problems" which affect ICPA transactions.[5]

Q Would you please summarize your findings?

A My principle findings are:

1. OVEC commits and dispatches the coal units into the PJM energy markets without including any variable operation and maintenance ("O&M") costs, even though these units do in fact incur variable O&M costs. This practice has the effect of offering the units at an artificially low cost, which causes them to operate more often, even during extended periods of time when energy revenues do not cover the actual variable costs of the units. This increases net OVEC costs in theory, and likely did increase costs during the 2018 and 2019 audit period. Operating during hours when energy revenues were lower than true variable costs resulted in significant net market energy losses for AEP Ohio. (*see* Section 2)

2. During 2018 and 2019, OVEC committed into the PJM energy market all the units, except for Clifty Creek unit 6, with a "must-run" status, meaning that these units are always committed to operate, regardless of prevailing market prices. During the audit period, OVEC's must run commitment strategy caused millions of dollars of losses in the energy market alone. In fact, there were [redacted] months during this period in which energy revenues were lower than variable costs,

[4] AEP Leadership Biography of Paul Chodak III. Attached as Exhibit JIF-3, and available online at https://www.aep.com/about/leadership/chodak. *Excerpt* "He is responsible for the management of AEP's nuclear, fossil, hydro and wind generating units, and Ohio Valley Electric Corp./Indiana-Kentucky Electric Corporation's (OVEC/IKEC) generating assets. This includes engineering, construction and operation of generating units, and activities related to fuel procurement and emission monitoring and logistics."

[5] ICPA, Section 9.05.

meaning that customers would have been better off if the plants had not operated at all. (*see* Section 3)

3. During 2018 and 2019, OVEC's coal inventory levels significantly exceeded OVEC's recommended inventory. OVEC's coal forecast process is unreasonable for several reasons, including that the coal forecast did not reflect a reasonable expectation of energy market price variability, did not reflect changes in energy market prices, and assumes that the coal units will commit (i.e., bid "must run") regardless of prevailing energy market prices. OVEC appears to procure coal without regard to expected energy prices or economics-based operation of the coal units. This practice harms customers because, in addition to the costs associated with handling a larger inventory, money that has been spent on obtaining unneeded coal is not available for useful purposes. (*see* Section 4)

4. The OVEC contract does not serve AEP Ohio customers cost effectively, and does not provide an efficient hedge against market prices. The cost of equivalent market services over the audit period would have been just 78% of the cost incurred through the energy and demand charges of the OVEC contract. Specifically, AEP Ohio spent $260.5 million on the demand and energy charges of the OVEC contract through the audit period, and only received $202.1 million in benefits from that contract. Throughout the audit period – and in fact for nearly every month since the Commission's 2016 authorization if the OVEC rider – the OVEC contract has been a net loss for OVEC's Sponsors. (*see* Section 5)

5. Information provided to and relied on by the Auditor is inconsistent with information made available either to other regulators or within the same filing. Perhaps most concerning, the Audit found that OVEC O&M costs were low compared to other coal plants, but this finding is erroneous because the Auditor relied on incorrect O&M cost information. The true O&M costs are more than [redacted] what AEP Ohio reported to the Auditor. (*see* Section 6)

6. The Auditor's reliance on the high capacity factor of the coal units as evidence of their economics is misguided. The OVEC units do not run at a high capacity

factor because it is economically optimal for them to do so, but because they are committed to operate out of merit. The OVEC units' heat rates are not extraordinary, and their variable cost of operating are high compared to prevailing energy prices. By incorrectly noting the "higher efficiency" and attributing it to the higher capacity factor, the Auditor implies that OVEC should continue to operate the coal units out of merit, at a loss to ratepayers, for the purpose of reaching improved heat rate performance. Such a practice would be inconsistent with good utility practice. (*see* Section 7)

7. The Audit does not reflect the true findings of the Auditor. Despite lacking any basis related to customers' interest, PUCO staff recommended that the Auditor remove the original conclusory finding that "keeping the plants running does not seem to be in the best interests of the ratepayers."[6] The Auditor's initial key finding was correct. (*see* Section 8)

Q What are your recommendations to the Commission?

A I have multiple recommendations, each of which is explained in the testimony that follows. I recommend:

1. The Commission require that AEP Ohio ensure that OVEC use appropriate marginal costs of production, including the full cost of variable O&M costs, in dispatch and commitment decisions. (Section 2)
2. The Commission only allow AEP Ohio the recovery of OVEC costs associated with the appropriate production and disposition of the OVEC units. (Section 2)
3. The Commission require AEP Ohio to make its customers whole by returning [redacted] to retail customers due specifically to uneconomic commitment and dispatch practices. (Section 3)

[6] *See* Emails from the Public Utilities Commission of Ohio. Attached as Exhibit JIF-11.

4. The Commission require AEP Ohio to seek to modify the OVEC Operating Procedures to specifically articulate a commitment procedure that is not simply a default "must run" directive, that minimizes cost, and that takes into account the variable O&M cost of the OVEC units. (Section 3)

5. The Commission require AEP Ohio to continuously assess OVEC's commitment decisions and maintain records of profit and loss, and specific commitment elections. (Section 3)

6. OVEC's coal procurement be aligned with reasonable market expectations, and be adjusted on the basis of prevailing market prices, and prudent plant operations, rather than an expectation of must-run commitment elections. (Section 4)

7. The Commission make ratepayers whole for the period covered by the audit, and require AEP Ohio to refund customers the difference between the cost of the OVEC contract and the value of the services provided by the OVEC contract. For the audit period, customers should be refunded the $69,041,238, or the final accounting after assessing charges or credits for December 2019. (Section 5)

8. The Commission correct the Auditor's findings, and issue a warning to AEP Ohio with respect to information offered in the audit process. Not only did AEP Ohio offer incorrect information that was then presented in full in the audit, but AEP Ohio was offered an (inappropriate) opportunity to review the audit, and failed to flag the incorrect data and findings. (Section 6)

9. The Commission's final order in this proceeding state its disagreement with the finding that the plants run often because of their high efficiency. (Section 7)

10. The Commission re-instate the Auditor's findings that the OVEC plants are not in the best interests of customers, and act on those findings to remove the OVEC plants from rates during the audit period, and on a going-forward basis. (Section 8)

2. OVEC'S MISCHARACTERIZATION OF VARIABLE COSTS LIKELY INCREASED COSTS FOR OHIO CUSTOMERS IN 2018 AND 2019.

Q Is there a difference between the variable cost of energy charged to the Sponsors and the variable cost of actually operating the coal units?

A Yes. OVEC's energy charge to the Sponsors includes only a fuel cost, a cost for chemical reagents used in emissions controls, and a cost of emissions allowances.[7] In reality, however, the variable cost of a coal plant goes well beyond its fuel, reagent, and emissions costs, and includes variable O&M costs. The National Energy Technology Laboratory ("NETL") in its "Cost and Performance Baseline for Fossil Energy Plants" identifies that variable operating costs for coal plants include reagents and chemicals, water, waste disposal costs for fly ash, bottom ash, and SCR catalyst, as well as maintenance materials used for continuous upkeep.[8] NTEL estimates that for a subcritical coal unit, such as the OVEC units, variable maintenance materials add $2.71/MWh to the variable cost of operation, while ash disposal adds another $1.53/MWh. Neither of these costs are incorporated into the energy charge levied by OVEC, but rather are included in the fixed charge component of the ICPA.

Q Why does it matter that the Sponsors aren't charged the actual variable cost of operating the coal plants as part of the energy charge?

A It matters because OVEC dispatches the coal units as if the variable operations and maintenance costs, with the exception of reagents, [redacted]. Both OCC and NRDC asked AEP Ohio which costs were included in dispatch decisions;[9] AEP Ohio cited only to the OVEC-IKEC PJM Fuel Cost Policy

[7] ICPA, Section 5.021.

[8] National Energy Technology Laboratory. Cost and Performance Baseline for Fossil Energy Plants: Volume 1: Bituminous Coal and Natural Gas to Electricity. September 24, 2019. Page 443. Excerpt attached as Exhibit JIF-4.

[9] OCC INT-05-004, attached as Exhibit JIF-5.

document, which lays out how OVEC determines the "incremental unit operating cost." That document states [redacted].[11] For clarity, the document provides an example of the determination of incremental cost, clearly [redacted] (see Confidential Figure 22, below).

Confidential Figure 2. Example 4 from the OVEC-IKEC PJM Fuel Cost Policy, showing an example determination of incremental cost.

[redacted]

Q What is the effect of not including variable O&M in the incremental cost of operation?

A In excluding the cost of variable O&M from the incremental cost of operation, OVEC assumes that the plants are cheaper on an energy basis than they really are, and subsequently operates the plants more often than is in the best interests of the Sponsors (or their customers). In addition, when the Sponsors, including AEP Ohio, characterize the value of the OVEC plants to their customers, they often

[10] OCC INT-05-003 Confidential Attachment 1. OVEC-IKEC PJM Fuel Cost Policy, October 2017. Page 4 of 20. Attached as Exhibit JIF-6.

[11] *Id*. Page 10 of 20, [redacted]

cite how inexpensive the energy is from the units. That is clearly a financial fiction, agreed to by the Sponsors, but not a reasonable utility practice, or a prudent operational practice.

Q Does operating the units more often because OVEC misconstrues its variable costs impact AEP Ohio's customers?

A Yes. This practice increases net OVEC costs in theory, and likely did in fact during 2018 and 2019. Operating during hours when energy revenues were lower than true variable costs resulted in significant net market energy losses for OVEC customers, and AEP Ohio's customers, through the OVEC contract.

Q What would happen if the cost of variable O&M were actually included as an incremental cost of operation?

A If OVEC included variable O&M costs in the incremental cost of operation, assuming that the operators are at least dispatching the units in accordance with market principles, the units would not operate as much during low-cost hours, and OVEC would not charge the Sponsors (and subsequently ratepayers) for operational and fuel costs incurred during those low-cost hours.

Taking the case to an absurd extreme, one could imagine that if fuel costs were all billed through a demand charge, the plant would recognize little or no "incremental cost of operation" and operate at full capacity regardless of market prices. And yet, the cost of fuel, incurred based on the tons of coal consumed, would still be billed to the Sponsors. It is transparently unreasonable to treat fuel, which is acquired by OVEC based on an expected fuel burn, and which can be consumed in greater or less quantity depending on the plant's operation, as a fixed cost. It is similarly unreasonable that incremental or variable O&M be excluded from the actual incremental cost of operation simply because the ICPA specifies that it be billed as part of a fixed charge to Sponsors.

Q What kinds of costs do or should fall into variable O&M?

A Any cost that varies as a function of output, or is adjusted as a function of output, should be considered a variable O&M cost. Water consumption, waste and effluent treatment and discharge, and the use of chemicals and lubricants all vary with the level of output.[12] As boilers, turbines, and associated equipment are used, they succumb to wear and tear, and require ongoing maintenance. For units with multiple starts per year, variable O&M includes maintenance outage cycles, the cost of which may increase with multiple starts.[13]

By correctly characterizing variable O&M, and incorporating it into operational decisions, plant operators can reduce costs – including O&M costs – by optimizing operations to high-value hours. By excluding these costs, a plant operator may run a plant during low-value hours, incurring those costs unnecessarily. This isn't simply accounting, it actually matters for operations and cost.

Q Did you estimate the value of variable O&M that should otherwise be included in the incremental cost of generation?

A Yes. I evaluated OVEC's billing statements to the Sponsors, which include a breakdown of the fixed charges, including Component B, described as "total operating expenses for labor, maintenance, materials, supplies, services, insurance, and administrative and general expenses."[14] Component B charges are divided into production, transmission, and administrative and general ("A&G") charges.

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[12] *See* Sargent and Lundy, for EIA. 2020. Cost and Performance Estimates for New Utility-Scale Electric Power Generating Technologies. https://www.eia.gov/analysis/studies/powerplants/capitalcost/pdf/capital_cost_AEO2020.pdf

[13] *See* EPA, 2018. Page 4-10. https://www.epa.gov/sites/default/files/2018-08/documents/epa_platform_v6_documentation_-_all_chapters_august_7_2018_updated_table_4-16.pdf

[14] Provided in LEI 1.2.21 Confidential Attachment 1, attached as Exhibit JIF-6.

I took production charges for operation (FERC Account 500), steam expenses (502), electric expenses (505), miscellaneous steam power expenses (506), and system control and load dispatching (556) to be variable costs. In 2018, those charges amounted to $[redacted]/MWh, on average, while in 2019 they amounted to $[redacted]/MWh (see Confidential Table 1). Roughly speaking, the variable O&M costs increase the incremental cost of operation by about [redacted].

Confidential Table 1. Variable O&M impact on variable production cost during the audit period

	Net Energy (GWh)	000$ Energy Charge	000$ Variable O&M	000$ Var Prod Cost	$/MWh Energy Charge	$/MWh Variable O&M	$/MWh Var Prod Cost
2018	12,170	$277,369	[redacted]	[redacted]	$22.79	[redacted]	[redacted]
2019	11,238	$275,298	[redacted]	[redacted]	$24.50	[redacted]	[redacted]
	23,408	**$552,666**	[redacted]	[redacted]	**$23.61**	[redacted]	[redacted]

Given the lack of information provided by AEP Ohio or OVEC, it is impossible to assign those costs to Kyger Creek or Clifty Creek specifically, much less any specific units.

Q Does AEP Ohio agree that variable O&M should be included in the incremental cost of generation when assessing dispatch and operations?

A Yes. In response to an Auditor query asking AEP Ohio to describe OVEC's coal burn forecasting methodology, the Company responds that "the generation forecast is prepared utilizing the cost of fuel delivered, as well as other data (fuel handling, *variable operations and maintenance*, consumable costs, scheduled maintenance outages, and forced outage factors) to determine the projected generation for each of the Companies' units in the PJM Interconnection, LLC ("PJM") Regional Transmission Organization power market."[15] The inclusion of

[15] LEI-DR-1.2.9. Emphasis added. Attached as Exhibit JIF-5.

variable O&M is not an error: NRDC asked AEP Ohio to confirm that generation forecasts include variable O&M, which AEP Ohio affirmed.[16]

AEP includes run-based maintenance as a variable O&M cost in other contexts, and has stated, in Ohio, that the identification of proper variable O&M costs is necessary "to ensure proper dispatch signal[s]."[17]

Q Can you summarize your findings here with respect to variable operations and maintenance accounting?

A Yes. OVEC's accounting for variable operations and maintenance costs are inconsistently applied, and ultimately harmful to AEP Ohio, and by extension AEP Ohio's customers. AEP Ohio and OVEC appear to agree that variable O&M must be accounted for in commitment and dispatch decisions when it comes to coal consumption forecasting, but not in the actual operations of the units. Instead, AEP Ohio and OVEC have agreed to ignore key variable O&M costs in dispatch and commitment decisions simply because their contract, the ICPA, allocates the billing of those costs to a demand charge, rather than a variable charge.

As a result of this mismatch, OVEC dispatches the OVEC units at a lower marginal cost than it actually takes to operate the units, and subsequently incurs a higher cost than necessary for energy. In particular, as I will show in the next section, the units run far more often than necessary both due to poor commitment practice as well as the misallocation of variable costs.

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[16] NRDC RFA 1-07. "AEP Ohio's knowledge [sic] is that OVEC utilizes several factors including prior year utilization included [sic] fuel cost delivered and variable operation & maintenance costs as states [sic] in LEI 1.2.9" Attached as Exhibit JIF-5.

[17] AEP Director of Business Development for OnSite Partners, Joe Glanzman. February 2020. Workshop for 24th Annual Ohio Energy Management Conference. Page 13. Attached as Exhibit JIF-7. Available online at https://mecseminars.com/sites/default/files/presentation-files/Tues.%2C%20Workshop%20P%20-%20Affordable%20Resiliency%20and%20Backup%20Generation.pdf

Q Did LEI discuss the discrepancy between the incremental costs of the coal units as used for the purposes of generation forecasts as oppose to as used for the purposes of commitment and dispatch?

A No.

Q What is your recommendation with respect to OVEC's use, or lack of use, of variable O&M in operational decisions?

A I recommend that the Commission require that AEP Ohio ensure that OVEC use appropriate marginal costs of production, including the full cost of variable O&M, in dispatch and commitment decisions. I recommend that the Commission only allow AEP Ohio the recovery of OVEC costs associated with the appropriate production and disposition of the OVEC units. In other words, I recommend that the Commission disallow the excess costs incurred by the mischaracterization of variable O&M costs in OVEC's dispatch and commitment practices. I run through a calculation of that adjustment in the next section of my testimony.

3. OVEC'S MUST-RUN DESIGNATIONS ON THE COAL UNITS RESULTED IN EXCESSIVE COSTS TO OHIO CUSTOMERS IN 2018 AND 2019.

Q In its audit, LEI comments on OVEC's energy management "must-run offer strategy," recommending that "OVEC carefully consider when and whether the must-run offer strategy is optimal" and noting that "in some months, it may result in negative energy earnings for the plants." Do you have an assessment of the must-run offer strategy employed by OVEC?

A Yes. I assess that the election to operate the units with a default "must-run" election resulted in millions of dollars of losses during the audit period, and resulted in excessive costs to Ohio consumers.

As LEI briefly describes, the process of self-scheduling coal plants has come under scrutiny in recent years,[18] including research papers from the market monitors of the Midcontinent Independent System Operator ("MISO")[19] and Southwest Power Pool ("SPP"),[20] and addressed by public advocates (including research I led), as cited by LEI. Self-scheduling refers to the decision-making process of coal plant operators about if a unit will operate on a particular day, or not. Coal-fired generators are relatively slow to come online, and coal operators cite concerns about thermal wear imposed by excessive cycling. To avoid excessive cycling, and take into consideration the slow ramp rate of coal units, coal operators need to make "commitment" decisions – i.e., whether a unit should be committed to operate for a period of time. The same decision-making process applies if a unit is offline (i.e., should the unit be brought online) or already operating (i.e., should the unit remain online, or be taken offline).

Prudent operation requires that operators do a proactive assessment asking if the plant is expected to be profitable over a period of days, or if will it lose money in the energy market (or in non-market regions, relative to the marginal system cost of production). Such an assessment is conducted relative to startup and shutdown costs. Simplified, if an offline coal unit would be expected to net energy revenues in excess of its start cost, it should be turned on (otherwise remain off). Conversely, if an online coal unit is expected to lose net energy revenues in excess of the avoided cost of starting, it should turn off (and otherwise remain on). To do this type of assessment, an operator must assess the full avoidable

[18] LEI Audit, page 22, Section 3.3.

[19] Potomac Economics (MISO Independent Market Monitor). September 2020. A review of the commitment and dispatch of coal generators in MISO. Available online at https://cdn.misoenergy.org/20201008%20MSC%20Item%2004%20IMM%20Coal%20Dispatch%20Study481336.pdf

[20] Southwest Power Pool Market Monitoring Unit. December 2019. Self-committing in SPP markets: Overview, impacts, and recommendations. Available online at https://spp.org/documents/61118/spp%20mmu%20self-commit%20whitepaper.pdf

production cost of the plant against expected market prices over a period of forecast days.

When a plant is online but the prevailing cost of energy is below its production cost, it turns down to a minimum level of generation (the "economic minimum") to attempt to prevent excessive losses.[21] However, that turndown alone may be insufficient to protect against extended low-priced periods of the year, at which point a plant needs to be taken offline – i.e., decommitted – to prevent excessive losses.

Q Why is self-scheduling coming under increasing scrutiny?

A In short, coal plants are no longer anywhere close to the relatively cheap resources they were once thought to be. Historically, coal plants were able to consistently operate at a cost below the prevailing marginal cost of energy, which meant that it was a reasonably safe bet that a coal plant could be left online and still make positive net revenues. However, the marginal cost of energy has decreased while the cost of coal has increased. Today, many coal plants are marginal resources in many hours of the year, and out of the money during extended low-priced periods. Proper operation requires either that coal operators make careful and well-documented self-commitment decisions, or use market mechanisms to optimize commitment decisions.

In PJM, if an operator makes a self-commitment election, they submit a "must-run" directive to PJM, indicating that the unit will be online. If they chose to use a market mechanism, they can submit an "economic" commitment offer to PJM, allowing PJM to determine if a commitment decision is economic or not. The

[21] In a centralized energy market like PJM, the signal to turn down a generator with marginal costs above the clearing price of energy is made by the regional transmission operator ("RTO"), or in this case, PJM.

commitment election is one of a number of constraints and designations made in the process of formulating and submitting bids to PJM.[22]

Q Is AEP aware of what would be entailed in proper unit commitment decision-making?

A Yes. AEP's Scott Mertz, charged with supporting AEP Service Company ("AEPSC") commercial operations across all of AEP's service territories, has described the unit commitment process for SWEPCO, an AEP company in Arkansas, Louisiana, and Texas operating in SPP in a different public utility commission proceeding.

> For example, to properly evaluate the unit economics requires information such as unit shut down and startup costs, forecasted demand not just for the next day but for many days in the future, corresponding forecasted day-ahead clearing prices, and potential performance issues for other units within SWEPCO's portfolio. This optimization process occurs outside the SPP IM [Southwestern Power Pool Integrated Market] responsibilities of SWEPCO as an SPP market participant, and relies on the combined expertise and coordination of the many groups within AEPSC for its success.[23]

SPP has similar energy market commitment options as PJM.

Q What does the unit commitment decision process look like at OVEC?

A OVEC, by default, assumes that all of the units, except for Clifty Creek unit 6, are given a "must-run" status – i.e., they're always committed to operate, regardless of prevailing market prices, unless the Sponsors request otherwise. As AEP Ohio

[22] *See* PJM Markets Gateway User Guide. PJM. August 2021. Section 6.8 https://www.pjm.com/~/media/etools/markets-gateway/markets-gateway-user-guide.ashx

[23] Rebuttal Testimony of Mr. Scott E. Mertz, in Arkansas Docket 19-008-U, August 20, 2019. Page 18. Attached as Exhibit JIF-8.

states, "With but one exception, units that are in service and expected to be available in the day-ahead market are offered as must run."[24] The Company further explains that "Outside of outages, if a unit is available, OVEC offers it into the PJM market [as must run]. Potential exceptions could include unusual non-market related events such as coal shortages and/or some form of force majeure event outside of OVEC's control."[25] LEI calls this OVEC's "must-run offer strategy,"[26] and attributes it to the Operating Committee's procedures.[27] Clifty Creek 6 is offered for "economic" commitment during the ozone season.[28]

Q Does AEP Ohio claim to review self-commitment elections at OVEC?

A Yes. According to the audit:

> OVEC's Energy Scheduling department has an internal daily call every non-holiday weekday morning to review unit status and availability, including applicable unit derates, potential unit liabilities, outage status and expected unit return-to-service dates, etc. This information is used to formulate the DA unit offers into the PJM market. In advance of the morning call, the Energy Scheduling department also receives a daily unit status report from each plant. Information in this report is updated, as appropriate, based on real-time unit operating status during the morning calls.[29]

[24] LEI 5.1.3(b), attached as Exhibit JIF-5.

[25] *Id.*

[26] LEI Audit, pages 45 and 54.

[27] LEI Audit, page 45.

[28] May 1 to September 30.

[29] LEI Audit, section 5.1.3.

Q During the audit period, did these "internal daily calls" result in any elections to submit anything other than a "must-run" directive to PJM for the OVEC units?

A No. And it is not clear that those "internal daily calls" actually review commitment elections at all with respect to economics.

NRDC requested that AEP Ohio provide records of must-run, economic, and outage notices to PJM. The Company simply responded that "units are offered as described in LEI 5.1.3(b) [see quote, above] consistent with the Operating Committee procedures."[30]

In reviewing the materials provided by AEP Ohio that are reviewed in the "internal daily call," there are no indications of economic condition, the cost of operation, or forecast market prices.[31]

Tellingly, John Swez, Duke Energy Ohio's representative to the OVEC Operating Committee, testified in a deposition conducted as part of Duke Energy Ohio's OVEC rider proceeding that there were periods throughout 2019 when he assessed that OVEC's "must-run" directives would result in losses at the OVEC units.[32] Mr. Swez describes a "profit and loss" assessment similar to that described by AEP's Scott Mertz, an assessment that AEP Ohio could also conduct. Despite the findings that the OVEC units were likely to sustain protracted losses in 2019, the OVEC units retained a "must-run" directive and were continuously committed.

> Q. Now, going back to 2019, were there ever any times when the Duke forecast of the expected profit and loss for the OVEC plants

[30] NRDC INT 1-011(a), attached as Exhibit JIF-5.

[31] *See* LEI 5.1.3 Attachment 1, attached as Exhibit JIF-5.

[32] Deposition of John Swez, pages 33-45, attached as Exhibit JIF-9.

showed that the revenues from the PJM day-ahead energy market might not cover the plants' variable operating costs?

A. Yes.[33]

Q You stated that OVEC's "election to operate the units as "must-run" resulted in millions of dollars of losses during the audit period." How did you come to that conclusion?

A To reach this conclusion, I constructed an estimate of the net energy revenues[34] received at each of the OVEC units, and then compared that against how the units fared if they were decommitted during periods of extended low energy prices. My process roughly replicates a profit and loss mechanism, as described by Duke's Mr. Swez. My calculation is an estimate because I do not have access to the near-term forecast market energy prices otherwise available to or employed by OVEC or AEP Ohio. While I would expect differences between forecast and retrospective (i.e., realized) pricing, I would not expect a systematic bias. Therefore, I believe the proxy results that I show here are appropriate for the purposes of assessing actions and to ensure ratepayers are made whole.

Confidential Table 22, below shows the net energy produced by the OVEC units in 2018 and 2019, and the net energy revenues earned by the OVEC units in that time. The units earned [redacted] in energy market revenue over those two years, after deducting the cost of fuel, reagents, emissions allowances, and variable O&M, as described in Section 2, above. The units generated a net 23,408 GWh during the audit practice.

In contrast, if the units were committed with reasonable utility practice, they would have only been operated to generate about half of the amount of energy (12,795 GWh) but generated [redacted] more net energy revenue, or [redacted]. By

[33] Deposition of John Swez, page 39, attached as Exhibit JIF-9.

[34] Net energy revenues are the gross energy revenues less the variable cost of production, multiplied by the net energy production for each OVEC unit.

virtue of poor commitment practices, the OVEC Sponsors paid [redacted] more than they should have for reasonable operations. The improvement was particularly important in 2019.

Confidential Table 2. Net energy and net energy revenues as operated and committed by OVEC during the audit period, and under improved commitment practice (OVEC-wide)

	As Committed		Improved Commitment		
	Net Energy (GWh)	Net Energy Revenue ('000$)	Net Energy (GWh)	Net Energy Revenue ('000$)	Losses due to Commitment Practice ('000$)
2018	12,170	[redacted]	[redacted]	[redacted]	[redacted]
2019	11,238	[redacted]	[redacted]	[redacted]	[redacted]
	23,408	[redacted]	[redacted]	[redacted]	[redacted]

Q Please briefly describe how you conducted your assessment.

A I derived net energy revenues by multiplying unit-specific hourly net energy[35] by imputed and actual day-ahead locational market energy prices ("LMP").[36] I estimated an improved commitment schedule using an algorithm that compared forward-looking net energy revenues[37] for a seven-day period against the

[35] Net energy scaled from unit-specific gross energy as reported to EPA's Clean Air Markets Database ("CAMD") Air Markets Program Database ("AMPD") through the Continuous Emissions Monitoring System ("CEMS"). Monthly net energy at plant-scale derived from EIA-reported data (EIA Application Program Interface). Note that OVEC appears to have reported net energy generation (i.e., after parasitic load) to EPA for calendar year 2018, and properly reported gross energy generation for 2019.

[36] Actual LMP used for calendar year 2019; imputed LMP used for calendar year 2018. Imputed LMP in 2018 calculated from unit-specific energy revenues (LEI 4.1.1 Confidential Attachment 1) divided by unit-specific net energy. Plant LMP taken as median value across units to normalize for outliers or mismatches during low energy production. Note that AEP Ohio reported unit-specific energy revenues in 2019 do not match unit-specific energy production as reported to EPA (*see* Section 6 of testimony.)

[37] Forward-looking net energy revenues uses operations as conducted, rather than theoretical dispatch, and uses actual or imputed LMPs (*see* prior footnote) as a proxy for forecast prices. For every day, the algorithm looks at total net energy revenues that would be realized over the next seven days, using actual operations as a proxy for optimal dispatch and required maintenance outages.

estimated cold-start cost for coal boilers.[38] If a unit was already online, it would only be decommitted if (a) it sustained forward-looking energy revenue losses in excess of the avoidable start cost (i.e., losses > start cost) or (b) it had an outage that had actually occurred. If a unit was offline, it would only be recommitted if it could anticipate forward-looking energy revenues in excess of the start cost. For simplicity, I assumed actual historical dispatch during committed hours as a proxy for optimal dispatch and required maintenance outages.

If this process were being conducted by the utility, I would expect them to use updated short-term energy market price forecasts (from either internal models or from vendors) and model or assess likely dispatch given prices to determine likely profits or losses over a reasonable commitment window.

Q Is it feasible that any of the uneconomic commitment that you've observed was due to anything aside from poor decision-making?

A Yes, but other factors are unlikely to have caused the degree of impact I observe here. For example, coal units require emissions testing every year (except when a unit is offline during the testing quarter),[39] or may be required for a specific capacity obligation or demonstration of capacity performance.[40] In those instances the unit may prudently be committed as must run to address non-economic constraints despite a forecast showing net losses during the period. There may also be mismatches between anticipated future energy prices that inform commitments and actual realized prices, particularly when prices fall relative to expectations. At OVEC, neither testing nor specific capacity obligations explain

[38] Estimated cold start cost of $417/MW from Graeter, P. and S. Schwartz. 2020. Recent Changes to US Coal Plant Operations and Current Compensation Practices. Prepared on behalf of National Association of Regulatory Utility Commissioners. Attached as Exhibit JIF-10. Previously available at https://www.naruc.org/about-naruc/press-releases/new-naruc-white-paper-explores-impacts-of-changing-generation-mix-on-coal-plants/

[39] 40 CFR 60, Appendix F, Sections 5.1.1 & 5.1.4.

[40] *See*, for example, Strengthening Reliability: An Analysis of Capacity Performance. https://www.pjm.com/-/media/library/reports-notices/capacity-performance/20180620-capacity-performance-analysis.ashx

the uneconomic operation during persistent low-cost periods of the year, particularly in 2019. It is possible that energy market predictions also did not match actual realized market prices, but for unbiased forecasts, these errors should be random, not systemically biased towards an overprediction of market prices. Overall, I believe that testing, specific obligations, and mismatches in energy market prices are likely *de minimus* relative to the losses I've calculated.

Q How does AEP Ohio characterize the value of the "must run" commitment strategy during the 2018 and 2019 audit period?

A AEP Ohio states that "Given OVEC's energy costs as determined pursuant to the PJM approved fuel cost policy, units offered as must run consistently covered fuel costs during the audit period."[41]

Q Is AEP Ohio correct that the "[OVEC] units offered as must run consistently covered fuel costs during the audit period?"

A No. Even if we exclude variable O&M costs, the OVEC units failed to "cover" their fuel costs in [redacted] 2018, and in [redacted] of 2019.

Q Did the OVEC units offered as must run cover their fuel and variable O&M costs during the audit period?

A No. As I noted above, there were significant periods in which the units did not cover their variable operations costs, amounting to [redacted] months in 2018 and 2019.

Q What are your main findings on OVEC's "must run" commitment strategy during the 2018 and 2019 audit period?

A First, the amount of net energy revenue squandered by improper commitment decisions in 2019 is significant. Considering the variable O&M of the OVEC

[41] LEI 5.1.3(b), attached as Exhibit JIF-5.

units, OVEC *lost* [redacted] in net energy revenue alone in 2019, not even accounting for the massive additional losses associated with the fixed costs of the units. The analysis indicates that had the OVEC units avoided operating during the extensive low energy priced periods of 2019, the units could have at least generated marginal positive revenue of [redacted]. In other words, in 2019 alone, OVEC's uneconomic commitment decisions cost the Sponsors [redacted].

Second, while the decision to self-commit with persistent "must-run" directives in 2018 was less impactful on the Sponsors, it was still imprudent and costly to ratepayers. The decision to maintain production in February 2018 alone cost the OVEC Sponsors nearly [redacted].

Third, the inclusion of variable O&M as a consideration in the operations of the OVEC units is extremely important, and its absence or mischaracterization has led to substantial ratepayer losses. I assess that with a conservative variable O&M estimate of $[redacted]/MWh (average 2018/2019), the OVEC units lost [redacted] in the audit period. However, by having mischaracterized avoided O&M as a fixed cost (i.e., $0/MWh variable O&M), OVEC (and the Sponsors) would have assessed only a $3.3 million loss due to uneconomic commitment practice – or ignored uneconomic commitment altogether. Conversely, if there is an even greater potential to avoid other maintenance costs through reduced operation, a variable O&M of $5/MWh[42] might have meant that OVEC lost as much as $43.6 million by specifying "must run" to PJM.

Finally, it must be stressed that the assessment here only considers energy revenue, and does not contemplate the demand charges, and the clear fact that the capacity value of the OVEC units does not come close to offsetting those charges. This assessment only evaluates the operational decisions made at the OVEC units,

[42] My estimate of $[redacted]/MWh variable O&M includes about 1/3rd of recorded O&M expenses. If just [redacted] of recorded plant-based O&M expenses (or any increment of transmission or administrative and general expenses) were characterized as variable, the expense category could quickly rise to $5/MWh or more.

but the substantial fixed costs of operating the units cannot be divorced or held separate from the energy value when contemplating impacts on Ohio customers.

Q Did AEP Ohio seek to change the commitment behavior of the OVEC coal units during the audit period?

A Not as far as I can discern. In response to multiple inquiries about commitment practice, AEP Ohio simply pointed to the Operating Procedures manual and claimed that it was the guidelines used by OVEC. However, the Operating Procedures were revised [redacted][43]

Q The Auditor recommend that "OVEC carefully consider when and whether the must-run offer strategy is optimal, as it appears that in some months, it may result in negative energy earnings for the plants."[44] Do you agree?

A Yes, although I think the Auditor does a disservice to Ohio customers in the soft recommendation. With representation on the Operating Committee, AEP and AEP Ohio had an obligation to inform other Sponsors of the impact that must-run decisions had on the cost of operations, and their net energy losses – at least in 2019, if not in 2018 or before.

In its discovery responses, AEP Ohio continuously casts itself as an observer of the Operating Committee, rather than a voting member, and a member with substantial influence. Asked if "AEP Ohio or its representatives contribute[d] to the drafting of the OVEC Operating Procedures," the Company responded that "OVEC personnel generally draft procedure revisions/edits, and the Operating Committee members review, provide comment, and vote on the procedures and

[43] LEI 13.1.1. Confidential Attachment 1, attached as Exhibit JIF-6.

[44] LEI Audit, page 54.

associated changes."[45] Similarly, when asked about AEP Ohio's ability to change "must run" designations at the Operating Committee, the Company responded that doing so would require unanimous consent.[46] There is no record that the Company even attempted to assess or communicate, much less request, lobby, or convince other Sponsors that uneconomic commitment had impacts on Ohio customers.

In deposition, Duke's liaison to the Operating Committee, Mr. Swez, describes that after assessing losses at OVEC on the energy market, he moved to notify OVEC, and subsequently the other Sponsors that they should re-evaluate the commitment process. He states:

> I mentioned in 2020 during COVID when I noticed, we monitor, and I saw the revenues not exceeding the variable costs, I notified OVEC. So that's what I would call a – a notice to OVEC that I believe now we need to change the commitment.[47]

Similarly, he discusses that even prior, he had "brought up" that the Operating Committee "need[ed] to work on creating a new process that starts to include periods where we may use a commitment status offer of economic in addition to must run."[48] He goes on to say that "it was generally received pretty favorably."[49]

As far as I can discern, AEP Ohio conducted no such analyses, made no communications about the losses, and did not seek to change the operating or commitment behavior of the OVEC units. Good utility practice requires that AEP Ohio, as the single largest party to the ICPA and in their oversight role on the

[45] NRDC INT 1-06, attached as Exhibit JIF-5.

[46] OCC INT 6-10, attached as Exhibit JIF-5.

[47] Deposition of John Swez, page 43, attached as Exhibit JIF-9.

[48] Deposition of John Swez, page 44, attached as Exhibit JIF-9.

[49] *Id.*

Operating Committee, would seek to closely monitor the operations of the OVEC plants and seek to buffer their customers from unnecessary avoidable costs.

Q What is the impact of uneconomic commitment decisions on AEP Ohio's customers?

A AEP Ohio's Power Participation Ratio ("PPR") is 19.93%, and so therefore its customers were damaged by that fraction of the [redacted] loss due to uneconomic commitment decisions, or [redacted] in the audit period.

Q What is your recommendation?

A In my opinion, AEP Ohio failed to assess, control, or modify, or insulate retail customers from imprudent bid behavior of the OVEC units. AEP Ohio failed to act in the best interests of retail ratepayers with respect to uneconomic commitment practice. I have three recommendations that stem from this finding:

First, I recommend that the Commission require AEP Ohio to make its customers whole by returning [redacted] to retail customers due specifically to uneconomic commitment and dispatch practices.

Second, I recommend that the Commission require AEP Ohio to seek to modify the Operating Procedures to specifically articulate a commitment procedure that is not simply a default "must run" directive, that minimizes cost, and that takes into account the variable O&M cost of the OVEC units.

Third, I recommend that the Commission require AEP Ohio to continuously assess OVEC's commitment decisions and maintain records of profit and loss, and specific commitment elections. In the alternative, if OVEC allows PJM to commit (or decommit) the OVEC units, the intensive assessment and reporting may be more limited in nature.

4. OVEC'S MUST-RUN DESIGNATIONS RESULT IN THE OVER-PROCUREMENT OF COAL.

Q How is fuel procured for the OVEC units?

A Fuel is procured through AEP Ohio's affiliate sister company, AEPSC, as described by the Auditor,[50] and using AEP policy and procedures.[51] The volume of fuel procured is based on an assessment of future coal burn requirements, which is based on forecast generation. According to AEP, OVEC's generation forecast is "prepared utilizing the cost of fuel delivered, as well as other data (fuel handling, variable operations & maintenance, consumable costs, scheduled maintenance outages, and forced outage factors).…"[52] According to AEP, "OVEC develops its forecasted fuel consumption and provides that forecast to AEP Ohio," and presumably AEPSC.

Q Did the Auditor have any comment on AEP's fuel procurement practices?

A Yes. The Auditor noted that both Clifty Creek and Kyger Creek, coal inventory levels of coal "significantly exceeded" OVEC's recommended inventory, particularly in 2019.[53] The Audit shows two graphics with coal inventory levels rising well above OVEC's recommended levels by April 2019, and remaining above recommended levels through the remainder of the calendar year.[54]

Q Does having excessive coal inventory incur additional cost?

A Yes. In addition to the costs associated with handling a larger inventory, money that has been spent on obtaining coal is not available for other purposes. Since January 2017, OVEC has billed the Sponsoring Companies $30 million per year

[50] LEI Audit, page 56.

[51] LEI Audit, page 57.

[52] LEI DR 1.2.9, attached as Exhibit JIF-5.

[53] LEI Audit, page 74.

[54] LEI Audit, Figures 41 and 43.

for "advance billing" for debt reserve,[55] a reserve (and cost) that OVEC might have reduced if it were able to retain more liquidity from a lower coal inventory.

Q How did AEP respond to the Auditor's recommendation that it "improve its inventory management" and that "more accurate outlooks for coal burns and tighter inventory controls could reduce the inventory surplus and thereby reduce inventory costs to OVEC ratepayers?"[56]

A AEP Ohio primarily cites the lower market energy prices sustained through 2019 as the reason that inventory levels increased, citing the PJM State of the Market Report to state that in "2019, the PJM day-ahead energy prices decreased 28.3% compared to 2018 and real-time energy prices were lower in 2019 than any year since the creation of the PJM energy market in April 1999."[57] AEP explained that the lower market energy prices resulted in lower generation.

Q Is AEP Ohio's explanation complete?

A No. The generation forecast produced by OVEC, and the coal procured by AEPSC, assumes that the OVEC plants will operate according to the "must run" directives approved by AEP Ohio in the OVEC Operating Procedures. When projecting coal amounts, OVEC effectively assumes that its plants will consume at least the amount of coal associated with continuous minimum operation, less maintenance and forced outages. As a consequence, when market prices fell in 2019, OVEC had not only planned for higher market prices, but had no mechanism to project a lower level of consumption based on prudent commitment practice. Had OVEC properly and prudently operated the plants in 2019, it would have been left with an inventory of coal far in excess of its expectations and guidelines. In fact, the only reason why the Auditor only observed an increase in

[55] OVEC Annual Report, 2020. Page 10.

[56] LEI Audit, page 76.

[57] AEP Ohio Comments, in Case No. 18-1004-EL-RDR, filed November 12, 2021, page 6.

the coal inventory that only doubled or tripled expectations (rather than a much larger multiple) is that OVEC's uneconomic operations left the plants burning far more than they should have during 2019. This suggests that OVEC acquires coal far in excess of its economic need.

Q Does OVEC's generation forecast and coal requirements forecast appear to be informed by reasonable expectations of prudent operations?

A No. OVEC's generation forecast appears to assume continuous operation, without regard to market prices or the operating cost of the coal units. In review of the coal requirements forecasts produced in early 2018 and 2019,[58] we can make several observations.

First, once the expected tons are converted back into generation,[59] it appears that OVEC may just seek to hit a [redacted] capacity annual factor at each of the coal plants every year (2018-2020). There is almost no variation year to year, except what appears to be variation for unit outages.

Second, it appears that OVEC does not adjust expected coal deliveries or requirements based on prevailing market prices or expectations. The 2019 coal consumption forecast starts in April 2019, implying that it was produced in the first quarter of 2019. By early 2019, energy market prices had fallen markedly, and many coal plants decommitted to avoid operating during those lower priced periods. Nonetheless, OVEC continued to project exactly the same coal deliveries for the remainder of 2019 as it had the year prior, and maintained the same expectation for those deliveries into 2020 and 2021.

[58] Provided in LEI 1.2.9 Confidential Attachments 1 & 2, attached as Exhibit JIF-6.

[59] Tons are provided in LEI 1.2.9; heat content for delivered coal years from EIA Form 923; heat rate for Kyger and Clifty Creek from EIA Form 923, 2018 and 2019.

Q What are your main findings with respect to coal procurement and coal inventories at the OVEC plants?

A OVEC's coal forecast process in the audit period did not reflect a reasonable expectation of energy market price variability, did not reflect changes in energy market prices, and assumes that the coal units will commit (i.e., bid "must run") regardless of prevailing energy market prices. As such, not only did OVEC face coal inventories well in excess of its expectations and guidelines, but it ended up obtaining and consuming coal inventories in excess of what was economically prudent, impacting AEP Ohio ratepayers.

A prudent reduction in coal procurement in response to energy market prices would have reduced inventory and coal handling expenses to AEP Ohio's customers as reflected in the energy charge.

Q What are your recommendations to this Commission with respect to fuel procurement practice at OVEC?

A I recommend that OVEC's coal procurement be aligned with reasonable market expectations, and be adjusted on the basis of prevailing market prices, and prudent plant operations, rather than an expectation of must-run commitment elections.

5. OVEC HAS NOT ACTED AS A COST-EFFECTIVE "HEDGE" AGAINST MARKET PRICES.

Q When the Commission authorized AEP Ohio to collect OVEC costs in rates, did it set an expectation of what purpose would be served by OVEC?

A Yes. In 2016, when the Commission first authorized AEP Ohio to collect OVEC costs in rates, the Commission accepted AEP Ohio's assertion that the contract would act as a financial hedge against market prices. Specifically, the Commission expressed the following aspiration:

> The [OVEC] PPA rider proposed in the amended application and the stipulation would operate as a financial hedging mechanism, with the effect of stabilizing or providing certainty regarding retail

> electric service. The PPA rider would smooth out fluctuations in market prices, because the rider would rise or fall in a way that is counter cyclical to the wholesale market. The PPA rider, therefore, is intended to mitigate, by design, the effects of market volatility, providing customers with more stable retail pricing and a measure of protection against substantial increases in market prices, with quarterly reconciliations to actual costs and revenues.[60]

The Commission re-asserted its hopes that the OVEC contract would act as a hedge in 2018, when it stated that the "intended benefit of the [OVEC] PPA Rider [is] a financial hedging mechanism with respect to the pricing of retail electric generation service."[61]

The audit process was meant to serve as an insurance policy that the open-ended nature of the OVEC contract did not spin out of control. This was articulated by then Chairman Haque in 2016, who stated the following:

> Because predictions of market prices beyond a few years are speculative, we must monitor the riders to ensure that ratepayers are purchasing the hedge that has been marketed to them. This should not be perceived as a blank check, and consumers should not be treated like a trust account.[62]

Q What is the purpose of a hedge, and how can it be determined if a hedge has been effective?

A A hedge is a contractual structure that is meant to smooth volatility. A well-constructed hedge based on cash flows should return approximately the same value as the product it is hedging. For example, locking in a fuel price for heating

[60] Opinion and Order, PUCO Docket 14-1693-EL-RDR, March 31, 2016, page 94.

[61] PUCO Docket 16-1852-EL-SSO, Opinion and Order, April 25, 2018, paragraph 252.

[62] Concurring Opinion of Commissioner Haque, PUCO Docket 14-1693-EL-RDR, March 31, 2016, page 5.

oil before the winter is a common hedge taken by many consumers to hedge against the potential for oil price spikes over the winter. If, given average conditions, the average consumer can be expected to pay approximately the same amount for fuel with a locked-in price as fuel exposed to market conditions, the hedge can be termed "effective."[63]

One way of assessing hedging efficacy is to examine the difference between the actual costs incurred from the hedging product (in this case, the OVEC contract) and the cost of the actual product being obtained (in this case, market energy and capacity).

Q Is it appropriate to look at just the energy charge relative to energy revenues when assessing the efficacy of the OVEC "hedge?"

A No.

The OVEC contract, the ICPA, provides two services (capacity and energy), and is paid for through two charges (the demand charge and the energy charge). As I discussed earlier, OVEC's billing of those charges does not reflect if those charges provide only an energy service or a capacity service. OVEC's billing, for example, does not distinguish variable or fixed O&M. And while AEP Ohio seeks to claim that the energy component of the OVEC contract is cost effective,[64] by the same token, the demand charge from OVEC would be wildly non-cost effective.

AEP Ohio does not only purchase energy from OVEC, and the audit does not (nor should it) assess only the energy cost of OVEC. Indeed, if AEP Ohio and the other Sponsoring Companies were to forgo the capacity of OVEC and not pay the demand charge, OVEC would be unable to find other buyers of capacity at demand charge prices.

[63] Note that in this example, fuel oil companies are likely to charge a premium for the service of offering the locked-in price (i.e. the hedge product).

[64] LEI 5.1.3(b), attached as Exhibit JIF-5.

Therefore, the energy and demand charge must be assessed as the singular contract in which they are packaged.

Q Did you assess the value of OVEC to the Sponsoring Companies?

A Yes. I compared OVEC's energy and demand charge against the equivalent energy market and market capacity value.

In AEP Ohio's case, the cost of equivalent market services over the audit period would have been just 78% of the cost incurred through the energy and demand charges of the OVEC contract. Specifically, AEP Ohio spent $260.5 million on the demand and energy charges of the OVEC contract through the audit period,[65] and only received $202.1 million in benefits from that contract,[66] leaving a deficit of $58,370,540 on energy and capacity during the audit period.

Q Hedged products protect from volatility, so wouldn't you expect there to be some periods in which a hedge loses relative to the product its hedging?

A Of course. But the OVEC contract doesn't display that behavior at all. Throughout the audit period – and in fact for nearly every month since the Commission's 2016 authorization[67] – the OVEC contract has been a net loss for OVEC's Sponsors.

As shown in Figure 33, below, during the audit period, the only two months in which revenues from the liquidation of OVEC's energy and capacity for AEP Ohio exceeded the costs of the contract in the audit period were January and February 2018, during a record temperature event. During every other month, the

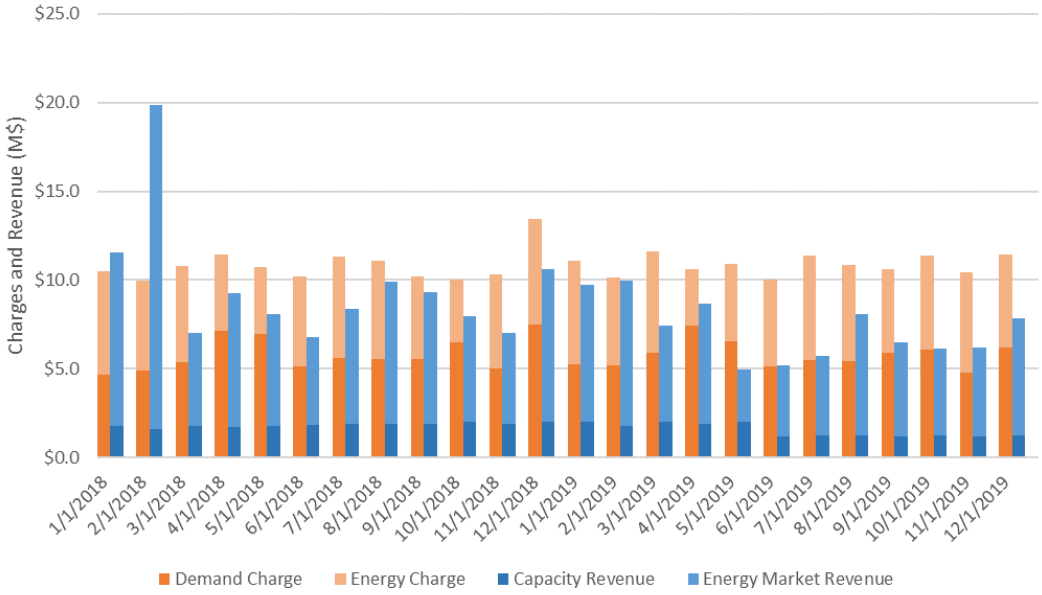
[65] Journal entries 5550144 and 5550095 from LEI 1.6.4 Attachment 1, "Actual OVEC" entries for the month indicated in the long description.

[66] Journal entries 4470228 from LEI 1.6.4 Attachment 1. Energy from entries 1200 and 1205 (day ahead and spot market energy) for "PJM RTO Actual" description lines. Capacity from entries 1600 and 2600 (RPM Auction credits).

[67] Refer to Direct Testimony of Jeremy Fisher in Michigan Docket U-20359, filed October 17, 2019. Figure 2. Billing from OVEC and equivalent revenues, by year. (for AEP's Indiana Michigan Company).

contract lost value, with the steepest losses incurred in 2019, in part due to the prior discussed uneconomic commitment practices.

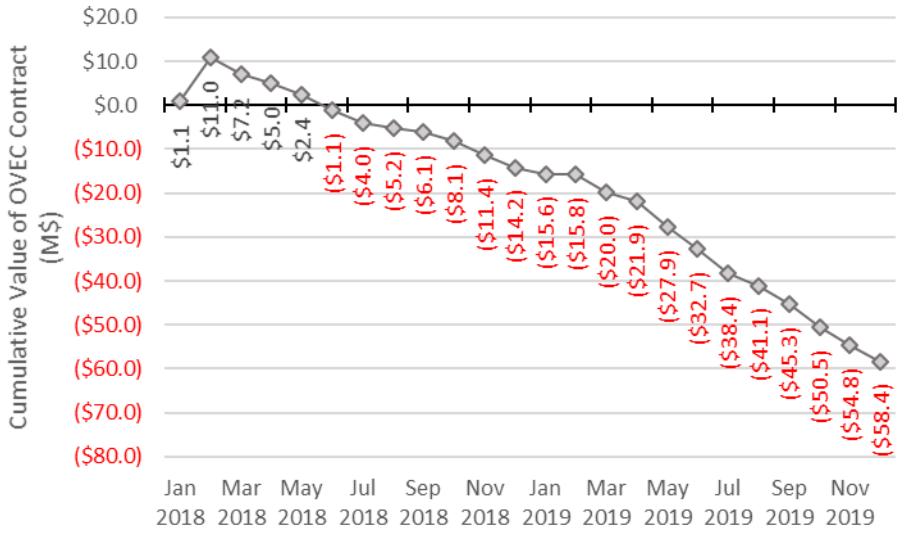
Figure 3. Monthly charges at AEP Ohio incurred through the OVEC demand and energy charge against capacity and energy market revenue from the OVEC participation share. Charges in orange, revenues in blue.[68]



The brief value obtained in February 2018 was wiped out completely by losses through June 2018, and the contract continued to lose value for AEP Ohio through the end of the audit period, as shown in Figure 44, below. By the end of the audit period, AEP Ohio had lost $58.37 million in value through the audit period for capacity and energy services from OVEC.

[68] See footnotes 65 & 66 for source data. Author's calculation.

Figure 4. Difference between OVEC monthly energy and demand charges to AEP Ohio and capacity and energy market revenues, cumulative (Author's calculation).



Q Does your assessment of the value of the OVEC contract match that conducted by the Auditor?

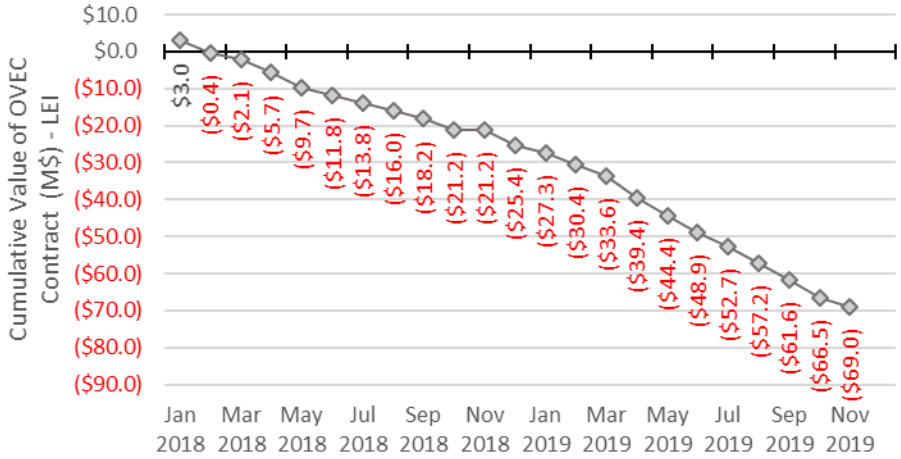
A Yes, although my understanding of the timing of various charges as they related to the value of the contract in different months is different than that of the Auditor. The Auditor ascribed all revenues and costs incurred at the end of a month to the prior month (i.e., what the Auditor calls January 2018 costs and liquidation revenues were recognized by AEP Ohio at the close of February).[69] Using the Auditor's methodology, verified against Figure 9 of the audit report, the losses incurred in the audit period were yet more dramatic, resulting in $69,041,238 in net losses to AEP Ohio customers (see Table 3 and Figure 55).

[69] Notably, the Auditor's methodology leaves no assessment of charges or revenues in December 2019.

Table 3. Revenue from PJM liquidation of OVEC services, and OVEC billing to AEP Ohio, using LEI methodology.[70]

Month (2018)	Revenue from PJM (acct. 4470228)	OVEC billing (5550095 + 555144)	Net OVEC Benefit (Loss)	Month (2019)	Revenue from PJM (acct. 4470228)	OVEC billing (5550095 + 555144)	Net OVEC Benefit (Loss)
Jan	$13,509,559	$10,521,911	$2,987,648	Jan	$9,139,756	$11,060,231	($1,920,475)
Feb	$6,572,890	$9,953,118	($3,380,228)	Feb	$7,003,429	$10,159,373	($3,155,944)
Mar	$9,132,150	$10,815,935	($1,683,784)	Mar	$8,461,913	$11,631,057	($3,169,145)
Apr	$7,841,101	$11,436,184	($3,595,083)	Apr	$4,794,002	$10,601,171	($5,807,168)
May	$6,644,387	$10,722,180	($4,077,793)	May	$5,903,166	$10,922,453	($5,019,287)
Jun	$8,098,167	$10,182,767	($2,084,600)	Jun	$5,548,356	$10,033,261	($4,484,905)
Jul	$9,411,047	$11,336,490	($1,925,443)	Jul	$7,591,597	$11,360,846	($3,769,249)
Aug	$8,848,089	$11,067,395	($2,219,307)	Aug	$6,357,829	$10,852,758	($4,494,930)
Sep	$7,978,205	$10,207,184	($2,228,979)	Sep	$6,211,280	$10,635,839	($4,424,559)
Oct	$7,012,246	$9,998,562	($2,986,317)	Oct	$6,511,421	$11,347,892	($4,836,472)
Nov	$10,292,012	$10,313,175	($21,163)	Nov	$7,834,095	$10,422,581	($2,588,487)
Dec	$9,288,746	$13,444,324	($4,155,578)	Dec	?	?	?
2018	**$104,628,597**	**$129,999,224**	**($25,370,628)**	**2019**	**$75,356,842**	**$119,027,462**	**($43,670,620)**
				Total	**$179,985,439**	**$249,026,687**	**($69,041,248)**

Figure 5. Difference between OVEC charges to AEP Ohio and PJM liquidations, using LEI methodology, cumulative



Q What do you conclude with respect to the hedge value of the OVEC contract?

A The OVEC contract has not, and does not, act as an effective hedge against market pricing. If the value proposition of the OVEC contract is as a financial

[70] LEI 1.6.4 Attachment 1, attached as Exhibit JIF-5.

hedge, as stated by the Commission in 2016 and 2018, then ratepayers have paid a costly premium over the value of the service they've been provided by OVEC.

The evidence shows that the OVEC contract does not serve AEP Ohio customers cost effectively, and does not provide an efficient hedge against market prices or products.

Q What is your recommendation to this Commission with respect to the OVEC contract?

A I recommend that the Commission make ratepayers whole for the period covered by the audit, and require AEP Ohio to refund customers the difference between the cost of the OVEC contract and the value of the services provided by the OVEC contract. For the audit period, customers should be refunded the $69,041,238, or the final accounting after assessing charges or credits for December 2019.

Q Are you recommending that customers should only pay the lower of either OVEC charges or market rates on a monthly basis?

A No. I am not recommending an asymmetrical treatment for either ratepayers or AEP Ohio. I am simply recommending that AEP Ohio neither charge nor credit retail customers for OVEC's net costs or benefits during the audit period or on a going-forward basis.

In spite of Commission Haque's admonition, the OVEC contract has become a blank check, and customers have been treated as a trust account. Customers must not bear the costs of AEP Ohio's imprudent management and continued reliance on the OVEC plants. Should the Commission elect to remove the OVEC costs from AEP Ohio customer charges, the imprudent commitment and operation decisions discussed in Section 3 would be rendered immaterial.

6. INFORMATION PROVIDED TO THE AUDITOR WAS INCONSISTENT OR INCORRECT.

Q Was the information relied upon by the Auditor fully consistent with information reported by OVEC or AEP Ohio to either other regulators or even within this filing?

A No. There are several instances where information provided to the Auditor (and in at least one instance, relied upon by the Auditor) is inconsistent with information made available either to other regulators or within the same filing. In at least two instances, including data on energy revenues data on O&M costs, it appears that the Auditor was provided substantively incorrect information by AEP Ohio.

Q What information provided by AEP Ohio regarding energy revenues from PJM appears to be erroneous?

A In its fourth set of discovery, the Auditor requested that AEP Ohio provide the hourly energy earnings in the PJM energy market for each power plant unit for every hour of the year.[71] The responsive data both excluded data for Clifty Creek unit 5 (providing redundant data for Clifty Creek unit 6 instead), and appears to have large inconsistencies in 2019 data relative to reported operations of the plant.

Q How do you know that the data provided by AEP Ohio was erroneous for 2019 data, holding aside the lack of reporting for Clifty Creek unit 5?

A The reported energy revenues include numerous hours where it appears there was PJM revenue earned despite specific units not operating, as reported to EPA's Clean Air Markets Database ("CAMD") Air Markets Program Database ("AMPD") through the Continuous Emissions Monitoring System ("CEMS"). Under federal law (40 CFR 75), emitting electric generating units are required to report hourly criteria emissions, as well as heat input, and gross energy production

[71] LEI 4.1.1, attached as Exhibit JIF-5.

("gross load") through CEMS. That information is rigorously assessed and reviewed.

AEP Ohio's energy revenue data, when compared against the EPA-reported CEMS data shows multiple hours, particularly in 2019, when units that were ostensibly non-operational apparently produced substantial revenue. While some transcription errors might be expected (and can be found in EPA's data occasionally), the mismatches in 2019 go beyond minor error. The data shows that for the 11 OVEC units, there were a combined 4,288 hours in 2019 in which OVEC reported zero generation to EPA, and yet AEP Ohio reported positive PJM market revenue. In total, the data would suggest $15.4 million in energy revenue earned during non-operational hours, amounting to more than 5% of energy market revenue earned in that year according to the same data.

Q Was the energy revenue data relied upon by the Auditor?

A Not as far as I can tell. However, it is not clear that the Auditor thoroughly checked the internal consistency of the materials provided in this matter.

Q Please describe the erroneous information provided and relied upon by the Auditor with respect to operations and maintenance costs at the OVEC plants.

A On page 100 of the Auditor's report, the Auditor states that it "examined the labor and non-labor cost for operating and maintaining ("O&M") the two [OVEC] plants."[72] The report goes on to state that "for the period of 2017-2019, the Clifty Creek and Kyger Creek plants spent an average of $38.4 million (or $29.43/kw-yr) and $35.0 million per year (or $32.21/kw-yr) on O&M, respectively." The Auditor concludes that "the total O&M cost on a dollar per kilowatt-year term is on the lower end of the industry average." The report cites a discovery response,

[72] LEI Audit, page 100 (public version).

LEI_7.5.2, as the basis for this information, and concludes, erroneously, that these are the entire set of O&M costs for the plants.[73]

In contrast, OVEC's billing statements to the Sponsors clearly articulate the operation and maintenance expenses incurred at the plants, as well as the administrative and general overhead, which include categories of expense that are typically included in O&M expenses. These costs are well in excess of the costs reported by AEP Ohio to the Auditor.[74]

Q How different are the O&M costs provided by AEP Ohio to the Auditor than those that appear in the billing statements?

A The O&M costs in the billing statements are more than [redacted] what AEP Ohio reported to the Auditor. According to the Auditor, AEP Ohio reported $73.4 million, on average, of O&M costs during the audit period for the OVEC plants.[75] In contrast, the billing statements show an average of [redacted] spent on production expenses alone,[76] and an average of [redacted] spent on administrative and general ("A&G") expenses during the audit period, including a remarkable [redacted] outlay to pensions and benefits in the last month of

[73] LEI's discovery question asked AEP Ohio to "provide labor and non-labor costs for non-outage maintenance activities for all units." AEP Ohio provided a spreadsheet with headers of outage and non-outage maintenance, which were integrated by LEI in their audit report and characterized as all operations and maintenance expenses.

[74] In footnote 176, LEI compares AEP Ohio's reported OVEC maintenance expenses against estimates from the Energy Information Administration ("EIA"), and articulates that fixed O&M costs "includ[e] Routine Labor, Materials and Contract Services, and Administrative and General Expenses." LEI does not include variable O&M in that characterization, despite the fact that OVEC does not distinguish between variable and fixed cost O&M.

[75] LEI Audit, page 100.

[76] LEI_1.2.21 Confidential Attachment 1, Component B, "Production Expenses" including operations, steam and electric expenses, maintenance, and rents, attached as Exhibit JIF-6.

2019.[77] In addition, the OVEC bills show an average [redacted] spent on OVEC-related transmission O&M expenses in the audit period. For the purposes of this assessment, I'll exclude these transmission costs. Overall, the reported O&M expenses in the Auditor's report amount to less [redacted] of the total O&M expenses billed.

Separately, the publicly-available OVEC Annual Report's consolidated statements of income and earnings show maintenance and non-fuel operation expenses in 2018 and 2019 amounting to $172.6 and $178.8 million, respectively.[78] These values are approximately [redacted] and markedly inconsistent with the information provided by AEP Ohio.

Finally, even the Auditor's own "spot checks" for O&M expenses disagrees with the O&M information reported on page 100 of the audit report. In Figure 10 of the audit report, the Auditor shows O&M expenses for just four months of 2019, amounting to [redacted]. For the Auditor's assessment to be consistent, this math would imply that OVEC spent over [redacted] of its O&M in just four months, spending just one third of the O&M in the other eight months that were not captured in the Auditor's spot check. This is clearly not the case.

Overall, rather than the Auditor's assessed "lower end" $29-32/kW-yr O&M expense, the O&M expenses at OVEC are closer to $[redacted]/kW-yr without A&G, or $[redacted]/kW-yr with A&G, well above the Auditor's cited industry average. It is clear that AEP Ohio provided incorrect information to the Auditor.

Q What is your recommendation to the Commission with respect to the information provided to the Auditor by AEP Ohio?

A I recommend that the Commission correct the Auditor's findings, and issue a warning to AEP Ohio with respect to information offered in the audit process. Not

[77] LEI_1.2.21 Confidential Attachment 1, Component B, "Administrative Expenses." Attached as JIF-6.

[78] OVEC Annual Report, 2019. Page 7. Available online at https://www.ovec.com/FinancialStatements/AnnualReport-2019-Signed.pdf

only did AEP Ohio offer incorrect information that was then presented in full in the audit, but AEP Ohio was offered an (inappropriate) opportunity to review the audit, and failed to flag the incorrect data and findings.

7. ELEMENTS OF THE AEP OHIO OVEC AUDIT ARE MISGUIDED OR INCORRECT.

Q The Auditor states that the OVEC units run often because of their "high efficiency."[79] Do you agree?

No. The Auditor's assertion is not supported by the evidence. The Auditor states that:

> Comparing to other coal units of similar size in PJM, OVEC's units have been operating with higher efficiency. Many of these other PJM coal plants are running at very low capacity factors (discussed in more detail in Section 9.3.6.2). A low CF [capacity factor] can result in higher heat rates, if the plants cannot run at optimal levels of output. Some such plants and have either announced or are planning for deactivation due to economic viability issues and aging problems.[80]

The Auditor's reasoning here is unfortunately misguided and provides a perverse, harmful incentive. The OVEC units do not run at a high capacity factor because it is economically optimal for them to do so, but because they are committed to operate out of merit. Their heat rates are not extraordinary.[81] The goal of energy optimization is to provide the best performance (capacity, energy, and other services) at the least possible cost.

[79] LEI Audit, page 108.

[80] LEI Audit, page 108.

[81] Clifty Creek and Kyger Creek have heat rates squarely in the middle of the pack, at the 52nd and 46th percentile amongst all electric coal generators in 2019, respectively. Author's calculation from EIA Form 923.

By incorrectly noting the "higher efficiency" and attributing it to the higher capacity factor, the Auditor implies that OVEC should continue to operate the coal units out of merit, at a loss to ratepayers, for the sake of reaching improved heat rate performance. Such a recommendation would be deeply problematic.

I recommend that the Commission's final order in this proceeding state its disagreement with the finding that the plants run often because of their high efficiency.

8. THE AUDITOR'S DRAFT FINDING THAT "KEEPING THE PLANTS RUNNING DOES NOT SEEM TO BE IN THE BEST INTERESTS OF THE RATEPAYERS" WAS CORRECT.

Q Does the audit fully represent the findings of the Auditor?

A No. According to email communications made public, a draft of the audit report was provided to both AEP Ohio and PUCO Staff prior to its finalization. While it is unclear if AEP Ohio communicated its concern about the audit's findings to PUCO Staff, an email indicates that PUCO Staff requested the removal of at least one key audit finding.

On September 8, 2020, just a week prior to the finalization of the audit, PUCO Staff recommended that the Auditor remove the conclusory finding that "**keeping the plants running does not seem to be in the best interests of the ratepayers**."[82]

This key finding was removed in the final report.

Q Was the finding that the plants were not in the best interests of ratepayers consistent with other findings of the Auditor?

A Yes.

[82] *See* Emails from the Public Utilities Commission of Ohio. Attached as Exhibit JIF-11. Emphasis added.

Section 4.3.3 of the audit is entitled "The OVEC plants cost more than they earn." Following, the auditor states, in part, that "[that the plants cost more than they earn] is obvious from the fact that the PPA Rider is usually a charge to AEP Ohio customers and not a credit…"[83] Immediately following, the audit reiterates:

> This analysis confirms that the ICPA costs AEP Ohio more than the value of the OVEC plants' energy and capacity in the PJM market.
>
> This conclusion is consistent with the net impact on AEP Ohio's PPA Rider. OVEC bills AEP Ohio for its entitlement to the output of the plants. AEP Ohio sells this entitlement into PJM, for a net deficit. The difference is billed to AEP Ohio's customers, in the PPA Rider.[84]

In other words, the deficit, or loss, associated with the OVEC plants is a loss for AEP Ohio's customers.

The Auditor then notes that "the current ICPA does not expire until June 30, 2040. AEP Ohio customers could be locked into paying a premium for energy and capacity from the OVEC plants for up to another 20 years…"[85] The clear implication is that AEP Ohio's ratepayers would be better off without the OVEC units in rates.

Q How could AEP Ohio reflect the Auditor's opinion for the benefit of its customers?

A AEP Ohio could remove the OVEC plants – i.e. the PPA Rider – from customer rates. Irrespective of if the plants continue to operate, AEP Ohio should not

[83] LEI Audit, 4.3.3, page 31.

[84] *Id*.

[85] *Id*.

charge customers for the costs of these plants. Removing the PPA Rider from rates would be consistent with the Auditor's recommendation.

Q Do you have a recommendation for the Commission with respect to the removed Auditor's finding?

A I recommend that the Commission re-instate the Auditor's findings that the OVEC plants are not in the best interests of customers, and act on those findings to remove the OVEC plants from rates during the audit period, and on a going forward basis.

Q Does this conclude your testimony?

A It does.

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Summary: Text Public Version of Direct Testimony of Jeremy I. Fisher electronically filed by Mr. Robert Dove on behalf of Natural Resources Defense Council