COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC TARIFF FILING OF	)	
KENTUCKY POWER COMPANY FOR	)	CASE NO. 2022-00387
APPROVAL OF A SPECIAL	)	
CONTRACT WITH EBON	)	
INTERNATIONAL, LLC		

TESTIMONY OF STACY L. SHERWOOD (CORRECTED)

ON BEHALF OF MOUNTAIN ASSOCIATION, KENTUCKIANS FOR THE COMMONWEALTH, APPALACHIAN CITIZENS' LAW CENTER, SIERRA CLUB, AND KENTUCKY RESOURCES COUNCIL AS JOINT INTERVENORS

February 8, 2023

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I. Introductions & Qualifications

Q. Please state for the record your name and business address.

A. My name is Stacy L. Sherwood. My business address is PO Box 587, Hinesburg, VT 05461.

Q. By whom are you employed and in what position?

A. I am a Managing Consultant at Energy Futures Group ("EFG"), a consulting firm that provides specialized expertise on energy efficiency and renewable energy markets, program design, power system planning, and energy policy. I provide technical assistance to energy efficiency organizations, environmental advocates, utilities, and nonprofit organizations to design, develop and implement policies and programs related to energy efficiency, energy policy and decarbonization.

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

A. I am testifying on behalf of Mountain Association, Kentuckians for the Commonwealth, Appalachian Citizens Law Center, Sierra Club, and Kentucky Resources Council (collectively "Joint Intervenors").

Q. Please describe your educational background.

A. I received a Bachelor of Arts degree in Accounting, Business Administration, and Economics from McDaniel College in 2009.

Q. Please describe your professional background.

A. I have over a decade of experience in the energy sector, related specifically to the review and development of energy efficiency and demand response programs and policies. I have been employed by EFG since October 2021. Prior to joining EFG, I was employed for six years by Exeter Associates, Inc., as a Senior Analyst where I provided technical support and analysis to state and federal clients on automated metering infrastructure, energy efficiency, distributed resources, demand response, and renewable energy. I have also participated in the review of utility rate cases in New Jersey, Pennsylvania, and Rhode Island. From 2009 through 2015, I worked at the Maryland Public Service Commission as a staff member with a focus on the regulatory review of Maryland's energy efficiency programs, known as EmPOWER Maryland. A copy of my curriculum vitae is attached as Appendix A.

Q: Have you previously filed expert witness testimony in other proceedings before this Commission or before other regulatory commissions?

A: I have filed testimony and comments before the Kentucky Public Service Commission ("Commission") in the East Kentucky Power Cooperative's 2022 Integrated Resource Plan, Case No. 2022-00098, and in the Electronic Tariff Filing of Kentucky Utilities Company for Approval of an Economic Development Rider Special Contract with Bitiki-KY, LLC, Case No. 2022-00371. Additionally, I have filed testimony before Commissions in Louisiana, Maine, Maryland, Pennsylvania, and Rhode Island regarding automated metering infrastructure, energy efficiency programs, revenue requirement and adequacy of service.

Q. What is the purpose of your testimony?

A. EFG was retained by the Joint Intervenors to assist in the evaluation of the Special Contract for Firm Electric Service between Ebon International, Inc. ("Ebon") and Kentucky Power Company ("KPCO") that was filed with the Kentucky Public Service Commission ("Commission") on October 28, 2022. This testimony evaluates the impact of providing

Ebon with an economic development discount and its adherence to applicable Commission Orders. My findings concerning limiting risk to ratepayers that can be posed by crypto mining facilities and recommendations on the Special Contract are further supported by the findings in the Direct Testimony of Chelsea Hotaling, which concerns evidence put forth on KPCO's Integrated Resource Plan ("IRP") and the marginal cost analysis in the Special Contract.

II. Summary of Recommendations

Q. Please summarize the request in this proceeding.

A. KPCO is requesting approval of the Special Contract between KPCO and Ebon. The Special Contract is for Ebon to receive service under the Industrial General Service tariff with a special rate design, as outlined in the contract, which allows Ebon to receive discounts ostensibly related to economic development that would result from the operation of the facility. Ebon's facility, which will be used to mine Bitcoin and Ethereum cryptocurrencies, will be brought online in two phases, with Phase 1 operating at 80 MW in year one and Phase 2 adding an additional 170 MW sometime in year two, for a total facility load of 250 MW.[1] In seeking to qualify for economic development discounts, Ebon has claimed that it will invest $250 million in its facilities and create 50-100 new jobs.[2] If the Special Contract is approved by the Commission, Ebon would receive service under the Special Contract for an initial term of 10 years, with the option to extend beginning in 2030. While the Special Contract provides an economic development discount, KPCO

[1] KPCO response to AG-KIUC-1-1.d. The level of capacity differs in this response from the Direct Testimony of Witness West, which stated that 100 MW would come online in Phase 1 and that the additional 150 MW will come online in Phase 2 after two years.
[2] KPCO responses to AG-KIUC-1-19 and AG-KIUC-1-20.

requests that it be approved separately from and outside of its current Economic Development Rider ("EDR").

Q. Please summarize your findings and recommendations in this case.

A. Based upon my review of the evidence in this case and the direct testimony provided by Witness Hotaling, I recommend that the Commission deny the approval of the Special Contract as proposed by KPCO. Furthermore, I recommend that the Commission consider minimum requirements and a standardized application related to the approval for special contracts which offer an economic development discount, particularly for cryptocurrency mining facilities ("crypto mining facilities"). A summary of my findings are as follows:

- The Special Contract offers electric services through the Industrial General Service and Demand Response Service tariffs and not the EDR tariff.
- KPCO lacks capacity to serve Ebon's requested level of load without procuring additional capacity or bringing additional generation online.
- Unlike under the Tariff EDR, Ebon would not be financially responsible for the procurement of additional capacity and therefore, the additional cost would be borne by existing ratepayers.
- The Special Contract offers an economic development discount on 250 MW of capacity for Ebon's facility, despite not having sufficient capacity under the cap provided in the Tariff EDR.
- A lease agreement for land owned by KPCO has been executed between KPCO and Ebon. KPCO ratepayers will be responsible for any property tax increases as a result of property improvements made by Ebon for its facility.

- Tax relief that Ebon has applied for and the limited number of jobs that can be filled by local residents will limit local and state economic development related to the Ebon facility, despite the significant increase in load.
- KPCO did not provide evidence to support that absent the EDR that Ebon would not locate its facility within the service territory.

Furthermore, I support the recommendations put forward by Witness Hotaling.

Q. How is the remainder of your testimony organized?

A. In the remainder of my testimony, I discuss the volatility of crypto mining operations, the requirements to issue an economic development discount, and my evaluation of the Special Contract application. For the Commission's consideration, I provide two recommendations, one related to KPCO's request and a second recommendation related to the review of future EDR applications for crypto mining operations.

III. Volatility of Crypto Mining Facilities

Q. What is crypto mining?

A. Crypto mining is the process used to create cryptocurrency, or digital coins such as Bitcoin or Ethereum through the validation of new transactions. These transactions are recorded on a blockchain network and added to a digital ledger. Crypto mining is an energy intensive process, due to the "proof-of-work" ("PoW") consensus algorithm which requires competitions between computers/miners to solve complex mathematical equations. The first computer to find the solution to the equation receives the next block of cryptocurrency.

Q. What are crypto mining facilities?

A. Crypto mining facilities can come in a variation of size and building types, ranging from warehouses to shipping containers. Regardless of size or building types, the facilities consist of similar equipment, including banks of computers, known as mining rigs, which always require a reliable internet connection and power source to compete for the cryptocurrency block. Additionally, crypto mining requires investment in cooling technology to keep the mining rigs operational.

Cryptocurrency mining operations are not tethered to any particular geography, but rather seek cheap energy, speed to market, and flexibility. For example, multiple companies offer mining equipment in shipping containers to chase the best prices,[3] and when prices fluctuate, mining facilities can migrate quickly. Cryptocurrency operations prioritize seeking out utilities where industrial electricity rates are low or discounted as in the present proposal.

Q. Please explain why crypto mining facilities are considered volatile.

A. First, crypto mining is relatively new in comparison to other industries which receive power from electric companies. First introduced in 2009 with Bitcoin, a type of crypto, the digital currency has had a volatile history. Some notable events include the 2013 crash in the price of Bitcoin, surging value of crypto in 2021, and 2022 marking the collapse of a crypto hedge fund and several crypto lenders. The value of crypto, in its short history, has fluctuated significantly regardless of the type. An example of this is provided in Figure 1 below, which displays the 5-year history of Bitcoin's value, and Figure 2 displays the 5-

[3] *See, e.g.*, EZ blockchain, *EZ Smartbox Mobile Mining Container* (last visited Oct. 24, 2022). https://ezblockchain.net/smartbox/.

year history of Ethereum's value. The value of crypto influences the level of mining activity, as miners need the value of the currency to outweigh the mining costs to create profit. The variance in price, particularly over the past five years determines the level of mining, and subsequently, the level of energy usage.

Figure 1 Bitcoin Value, Most Recent 5 Years

Source: Google Finance, captured February 3, 2023

Figure 2 Ethereum Classic Value, Most Recent 5 Years

Source: Google Finance, captured February 3, 2023

Second, unlike traditional facilities, which have invested significant capital in permanent structures, crypto mining operations are typically housed in temporary building structures and can be easily relocated. The temporary structure model allows for mining operations to be flexible, including by quickly shifting operations among facilities and states, to react to energy rates and cryptocurrency market conditions.[4]

Q. What can this volatility mean for KPCO's existing customers?

A. Given that crypto mining operations are highly dependent on market conditions and can be quickly and easily shut down or relocated, there is an inherent risk for existing ratepayers

[4] *See*, *e.g.*, Eliza Gkritsi, Bitcoin Mining Middleman Compass' Georgia Facilities to Close as Energy Prices Soar (Sept. 1, 2022), https://www.coindesk.com/business/2022/09/01/bitcoin-miningmiddleman-compass-georgia-facilities-to-close-as-energyprices-soar/ (reporting move of Georgia mining machines to Texas, only two months after company had moved some machines from Texas to Georgia).

if a utility is required to invest in transmission or distribution grid infrastructure.[5] If the upgrades are needed, those costs could be borne by the other ratepayers if the mining operations cease or exit the service territory without a safeguard in place – even if the associated infrastructure upgrades provide little or no benefit to those ratepayers. Requiring safeguards, in the form of a bond or an upfront contribution-in-aid-of-construction ("CIAC"), from the crypto mining operation seeking an economic development discount, should mitigate concerns about increased costs for existing ratepayers. The level of investment on behalf of the crypto mining operation should be dependent upon whether the utility upgrades provide shared benefits to the existing ratepayers.[6] Similarly, given the high energy usage for crypto mining facilities, it is important to require a bond equivalent to a portion of their annual electric bill.[7]

Q. Have any recent changes been made to the mining process for either of the cryptocurrencies that Ebon will mine?

A. Yes. Crypto mining is an energy intensive process, due to the "proof-of-work" ("PoW") consensus algorithm which requires competitions between computers/miners to solve complex mathematical equations. However, in September 2022, Ethereum shifted from a PoW system to a "proof-of-stake" ("PoS") method, in which validators who securely verify

[5] *See* In the Matter of the Application of Entergy Arkansas, LLC for a Proposed Tariff Regarding Large Power High-Load Density ", Direct Testimony of D. Andrew Owens, at 13 (Jul. 28, 2022), Ark. Pub. Serv. Comm'n, Docket No. 22-032-TF, http://www.apscservices.info/pdf/22/22-032-TF_16_1.pdf (describing an incident in 2019 where a new cryptocurrency mining customer requiring significant facility upgrades opted to pay a monthly minimum for those upgrades—only to move its shipping containers "virtually overnight" "shortly after taking service . . . effectively disappearing" and leaving the utility unable to even reach the customer to recoup their upfront costs).

[6] For example, if the infrastructure upgrades and investments benefit other customers, then a cost sharing approach should be considered.

[7] KPCO requires a deposit equivalent to 2/12 of a customer's estimated annual bill at full tariffed rates per KPCO's response to KPSC-2-1.

transactions in the blockchain must lock up a portion of their crypto to secure the network. Per the Ethereum Foundation, the PoS method is extremely energy efficient compared to PoW and is expected to reduce energy consumption for Ethereum mining by 99.95%.

Q. Please explain how this change could impact Ebon's facility?

A. This change in process, although not adopted by Bitcoin, could significantly change the projected load for Ebon, depending on the level of Ethereum it plans to mine. It's likely that, over the 10-year special contract period, advances (and potentially, regulation) to reduce the energy intensity of crypto mining will continue. As such, it is unclear how Kentucky Power's investment in the projected electric load for Ebon's facility now of 250 MW may be shifted to other ratepayers if Ebon's load decreases. There are several uncertainties surrounding the electric load for crypto mining facilities and without proper safeguards, it is easily understandable how other ratepayers may be left footing the bill for the additional capacity, something Kentucky Power is currently lacking.

Q. Are there known instances that support the concern regarding the cryptocurrency mining industries' volatility?

A. Yes. There are several instances throughout the United States where ratepayers have been burdened with costs to bring a cryptocurrency customer online, as well as instances in which utilities have requested to provide protections for existing ratepayers and the company. Below is an outline of a few examples.

- Entergy Arkansas has requested Commission approval to require all cryptocurrency mining customers to pay for all network upgrades upfront through a Contributions in Aid of Construction rather than over time to limit the financial risk.[8]

- The town of Plattsburgh, New York experienced the negative consequences of an influx of cryptocurrency mining operations. Although there was some increased tax revenue, there were minimal jobs or stimulation for the local economy. Furthermore, the increase in electricity demand from crypto mining operations increased the monthly bills for all ratepayers. It was determined that the increase in tax revenues only partially offset the increase in electric bills.[9]
- Idaho Power requested that cryptocurrency mining operations prepay for required infrastructure upgrades to prevent stranded assets for remaining ratepayers when the economics of cryptocurrency mining change.[10]

IV. Economic Development Discounts

Q. What benefits are gained from offering an EDR discount?

A. There are two primary benefits that are expected to result when an EDR discount is provided to a facility. First, it promotes economic development with the Commonwealth of Kentucky. When facilities opt to locate within the utility's service territory it subsequently creates new jobs, provides an influx of capital investment, and provides an

[8] In the Matter of the Application of Entergy Arkansas, LLC for a Proposed Tariff Regarding Large Power High-Load Density," Direct Testimony of D. Andrew Owens, at 13 (Jul. 28, 2022), Ark. Pub. Serv. Comm'n, Docket No. 22-032-TF, http://www.apscservices.info/pdf/22/22-032-TF_16_1.pdf.

[9] Benetton, Matteo and Compiani, Giovanni and Morse, Adair, When Cryptomining Comes to Town: High Electricity-Use Spillovers to the Local Economy (May 14, 2021). Available at SSRN: https://ssrn.com/abstract=3779720 or http://dx.doi.org/10.2139/ssrn.3779720.

[10] Idaho Pub. Utils. Comm'n, *Application of Idaho Power Co. for Authority to Establish a New Schedule to Serve Speculative High-Density Load Customers*, at 13-14, Case No. IPC-E-21-27 (Nov. 4, 2021), https://puc.idaho.gov/Fileroom/PublicFiles/ELEC/IPC/IPCE2137/CaseFiles/20211104Application.pdf.

increase to local and state tax revenues. Second, existing ratepayers benefit as a result of a customer being added to the system, i.e., increasing the number of ratepayers from which fixed costs are recovered lowers the cost to individual ratepayers. According to KPCO's Tariff EDR, the discount is reserved for operations that "will promote sustained economic development based on plant and facilities investment and job creation."[11]

Q. Are there requirements to qualify for service under the EDR?

A. Yes. Per KPCO's EDR tariff, the applicant must provide a written application to the Company with the following information:

> "a. a description and good faith estimate of the new or increased load to be served during each year of the contract,
>
> b. the number of new employees or jobs that will be added as a result of the new load,
>
> c. A description of the anticipated capital investment,
>
> d. A description of all other federal, state, or local economic development tax incentives, grants, or any other incentives or assistance associated with the new or expanded project, and
>
> e. A statement that without the EDR discount, the customer would locate elsewhere or would choose not to expand within Kentucky Power's service territory."[12]

Additional applicable requirements from KPCO's EDR include:

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[11] Kentucky Power Tariff P.S.C. KY No. 12 Original Sheet No. 37.1, effective January 14, 2021.
[12] Ibid., Original Sheet No. 37-2.

> "The Company will offer the EDR to qualifying customers with new or increased load when the Company has sufficient generating capacity available. When sufficient generating capacity is not available, the Company will procure the additional capacity on the customer's behalf. The cost of capacity produced on behalf of the customer shall reduce on a dollar-for-dollar basis the customer's Incremental Billing Demand Discount and Supplemental Billing Demand Discount."
>
> "The new or increased load cannot accelerate the Company's plans for additional generating capacity during the period for which the customer receives a demand discount." [13]

In addition, the following language from the Order in Administrative Case 327 indicates that an EDR discount should not be extended to potential or existing customers unless it can prove that the energy load would not occur absent the discount.

> "The Commission concludes that the revenue loss resulting from free riders taking advantage of rate discounts offered through general EDR tariffs is detrimental to the utility and all nonparticipating ratepayers. The Commission seeks to minimize the number of free riders taking advantage of discounted utility rates in Kentucky."[14]

Furthermore, the utility has an implicit responsibility to ensure that the information provided in the application is reasonably accurate and made in good faith.

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[13] Ibid, Original Sheet No. 37-1.
[14] Order, *In re: An Investigation into the Implementation of Economic Development Rates by Electric and Gas Utilities*, at 7 (Ky. P.S.C. Sept. 24, 1990).

Q. Is KPCO offering service under the Tariff EDR as part of this special contract?

A. No, it is not. However, KPCO is requesting approval to offer an economic development discount and as such, the same rules established by the Tariff EDR should be applicable to the Special Contract, as well as the 1990 order in Administrative Case No. 327 that established the implementation of economic development rates. The direct testimony of Chelsea Hotaling further discusses whether this Special Contract meets the eligibility provisions related to available capacity.

Q. By not requiring the Special Contract to be subject to the Tariff EDR, are there potential impacts to existing customers?

A. Yes. The Tariff EDR caps the amount of capacity available under a special contract at 250 MW. Per KPCO, it has already issued one or more special contracts for 39 MW of that cap, leaving 211 MW unsubscribed (West page 11, lines 11-12). Phase 1 of the Ebon project would reduce the unsubscribed portion to 131 MW. Phase 2 of the Ebon project would utilize the remainder of that portion, while also requiring an additional 39 MW beyond the cap. As the 250 MW under the Ebon Special Contract would not be subject to the cap, this could mean that in the KPCO service territory, a total of 500 MW of load could receive an economic development discount. Offering discounts for this level of load goes well beyond past Commission orders, is equivalent to KPCO's EDR capacity cap, and would be detrimental to existing customers that will have to support the cost differences. Furthermore, to exceed the cap previously authorized by the Commission, there should be significant economic development contributions with certainty provided. As discussed further below, KPCO has not demonstrated here that the Ebon facility would provide this.

In addition, the service territory has insufficient capacity to serve this new load, which violates the Terms and Conditions of the Tariff.

Q. Your testimony indicates that although the Special Contract is not offered under the Tariff EDR, it should be subject to the provisions within the tariff. In regard to the EDR discount requirements, do you believe that the Special Contract has met the requirements to extend an EDR to Ebon?

A. No, I do not. First, the evidence in this case does not support that absent the EDR discount Ebon would not locate its operations within the service territory. The separate lease agreement with KPCO and ability to receive tax exemptions related to the school tax are also significant incentives for Ebon to locate within the service territory. Second, KPCO lacks the capacity to support the level of requested load without the purchase of additional capacity and/or bringing additional generation online. Third, the level of requested capacity for Ebon is equivalent to the entire cap for the Tariff EDR, under which KPCO already has established EDR discounted capacity. If accepted, KPCO will be able to offer 500 MW of capacity at an economic development rate, unless the Commission limits the economic discount provided to Ebon to the amount of capacity remaining under KPCO's Tariff EDR cap.

Q. Review of the Proposed Special Contract

Q. In this proceeding, are you concerned about increased costs for existing customers if the Special Contract is approved?

A. After reviewing the evidence in this case, including KPCO's responses to data requests, I am concerned. First, KPCO lacks sufficient capacity, as discussed in Witness Hotaling's testimony, to support Ebon's requested load. As a result, KPCO would need to purchase additional capacity and/or bring additional generation online, the cost of which will impact existing ratepayers. Second, if Ebon is not responsive to requests to decrease load under the Demand Response Service tariff, it could have negative consequences related to PJM five coincident peaks ("5CPs"), which will result in additional costs the following year that will be incurred by Ebon and other ratepayer. Third, the terms of the lease agreement between KPCO and Ebon would result in any increase in property taxes, particularly those from improvements made by Ebon, to be paid by KPCO, which ultimately would be passed on to ratepayers.[15]

Q. Do you have concerns about whether the Special Contract would in fact result in economic development?

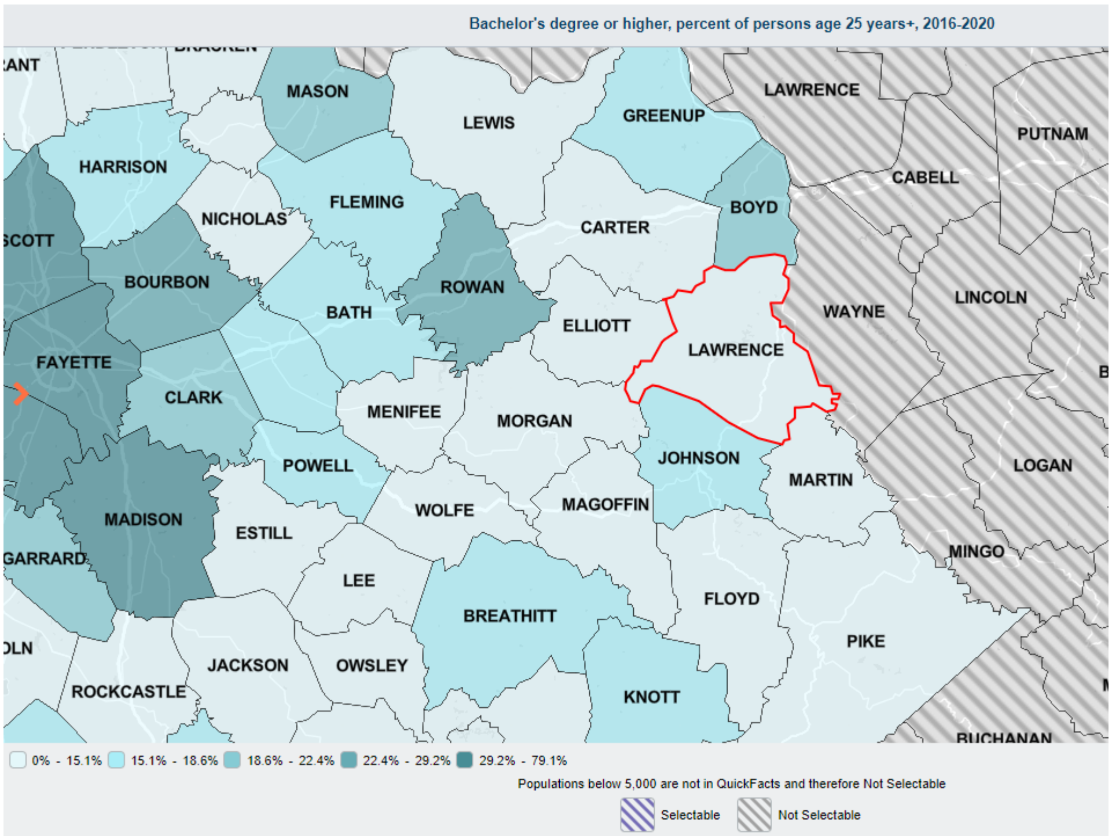
A. Yes. First, Ebon applied with the Kentucky Department of Revenue to be exempt from utility gross receipts license tax. As a result, Ebon will not be assessed the school tax through June 30, 2030, which is a significant decrease in economic benefits for the area.[16] Second, I have reservations on how much of the investment made by Ebon will directly have an impact on the local economy, not only from the investment that Ebon will make for the facility, but also in the number of jobs that will be able to be fulfilled by the local residents.

In terms of new employment, KPCO indicates that Ebon's operations are "highly technical" and would necessitate hiring and maintaining approximately 100 positions of which a "majority of these position are for the most very technical professional positions."

[15] KPCO response to JI-2-3 a.
[16] KPCO response to JI 2-2.

(West page 10, lines 3-9).[17] Highly technical positions typically require higher education. Per the U.S. Census, approximately 9% of Lawrence County, Kentucky residents 25 years or older have a bachelor's degree or higher.[18]

Figure 3 Percentage of Residents with a Bachelor's Degree or Higher, By County



Note: Produced using the United States Census Bureau's QuickFacts Map Function
https://www.census.gov/quickfacts/fact/map/lawrencecountykentucky/EDU685220

Of the 57 jobs identified in response to AG-KIUC-1-19, only 41 jobs do not have a requirement of a bachelor's degree or experience in jobs which typically require a bachelor's degree (e.g., human resources). As indicated in KPCO's response to AG-KIUC-1-19, there are only 4 job types available to those without higher education, which include

[17] Exhibit 1, Special Contract Page 2 Condition 5 indicates that the customer will create 50-100 new permanent full-time jobs by June 2024.
[18] https://www.census.gov/quickfacts/lawrencecountykentucky

Facility Maintenance Engineer (2 positions), Facility Maintenance Technicians (5 positions), General Maintenance Worker (30 positions), and Security Guard (4 positions). While the salaries/hourly wages for each position are not decided, the salaries for the positions listed above are among the lower paying jobs that will be offered by Ebon.[19] It is important to note that there is still uncertainty surrounding which jobs will come to fruition and furthermore whether the jobs will be fulfilled by local residents. Even though Ebon has asserted that it is using a local recruiter to fulfill the positions it has identified, the proposed Special Contract does not require Ebon to hire any local residents for any jobs in exchange for the discounts from KPCO. As such, it's unclear what the level of economic impact the Ebon facility would have on the local or state economy.

The unknown level of economic development offered by the Special Contract is concerning, particularly in a region that has been severely affected by recent weather events. The location of this facility is in an area that would greatly benefit from true and sustained economic development. It's unclear if the Ebon facility will provide that. At the same time, it would consume economic development discounts well beyond anything the Commission has approved for KPCO in the past and thereby limit KPCO's ability to consider offering other, potentially more impactful economic development discounts in the future.

Q. Are there additional economic impacts that should be considered when evaluating the Special Contract?

A, Yes. In addition to jobs and investment by Ebon, the 250 MW increase in load can ultimately impact energy prices, which can impact all customers, including residential.

[19] KPCO response to AG-KUIC 1-19, Attachment 2, page 1.

Q. In addition to economic development concerns, are there any environmental or health impact concerns regarding the proposed 250 MW crypto mining facility?

A. Yes. The environmental impact of locating the facility on KPCO's property is unclear, in particular with its proximity to the Big Sandy River. The development of a substation and the Ebon facility should be reviewed for potential environmental impacts; however, KPCO objected to providing information on environmental site assessments.[20] Furthermore, knowing that Kentucky Power needs to procure additional capacity to meet Ebon's load, it seems likely that the Big Sandy generation unit may need to operate more and/or have its life extended for additional years into the future to serve some or all of Ebon's load. If Kentucky Power, through its integrated resource plan, identifies that the Big Sandy generation unit will have increased generation and/or an extended lifespan to serve Ebon's load, then it is likely that an increase in greenhouse gas emissions will occur. However, it is likely that regardless of the source of generation, emissions will increase, as the marginal fuel in PJM is predominately gas and secondarily coal.

In response to this question it is unknown exactly how Kentucky Power plans to meet the Ebon load because to date we have seen no analysis for their system with or without Ebon, such as we would expect to see in Kentucky Power's forthcoming integrated resource plan (due to be filed March 20, 2023). However, knowing that Kentucky Power needs to procure additional capacity to meet Ebon's load, it seems likely that the Big Sandy generation unit may need to operate more and/or have its life extended for additional years into the future to serve some or all of Ebon's load. If Kentucky Power, through its integrated resource plan, identifies that the Big Sandy generation unit will have increased

[20] KPCO response to JI 2-3c.

generation and/or an extended lifespan to serve Ebon's load, then it is likely that an increase in greenhouse gas emissions will occur. However, it is likely that regardless of the source of generation, emissions will increase, as the marginal fuel in PJM is predominately gas and secondarily coal. (Source: https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2022/2022q3-som-pjm.pdf, p. 199). Furthermore, as noted in Witness Hotaling's testimony, the location of Ebon's facility on KPCO's land may affect the potential for renewable energy to be developed at this location in the future.

Q. Are there additional concerns you have regarding lack of protections for ratepayers within the Special Contract?

A. Yes. Based on the review of the KPCO's Exhibit 1, there are several instances where protections for KPCO's existing customers are lacking.

Per Section 3.3, Ebon can increase or decrease the Total Capacity Reservation by providing written notice to the KPCO one year in advance. The significant level of load, not only above the Tariff EDR cap but also above the level of available capacity in the service territory, and annual increases or decrease in load, can result in existing customers bearing significant costs, either through the need for procurement of capacity or because of excess capacity of generating units if Ebon were to significantly decrease its load.

While I do not recommend approval of the Special Contract, if the Commission were to grant it, then I recommend the following addition to the contract. An increase or decrease in load should be limited to a maximum annual percentage to limit any potential negative impact on the KPCO's existing customers. Furthermore, if the load is decreased, it cannot result in significant excess capacity and if increased, it should not require additional capacity to be constructed. Additionally, it should be made clear that if Ebon indicates that it will decrease the Total Capacity Reservation below 80 MW after 12 months or 250 MW after 24 months, then the Special Contract rate would not be applicable.

Per Section 5.5, KPCO indicates that after 24 months of the Contract's effective date, the customer must achieve and maintain an average on-peak monthly demand of 250 MW. After 12 months of the Special Contract's effective date, the customer's average on-peak monthly demand cannot be less than 25 MW. If the average on-peak monthly demand is below either of these limits, then standard rates and billing are applied to the applicable month's bill. The average on-peak monthly demand beginning 12 months after the Special Contract's effective rate is low compared to the Phase 1 request of 80 MW. Otherwise, other ratepayers will be required to offset the costs, particularly in years when KPCO needs to procure the capacity to fulfill this load.

While I do not recommend approval of the Special Contract, if the Commission were to grant it, then I recommend the following addition to the contract. Like the provision in KPCO's Tariff EDR, Ebon should be financially responsible for any capacity procurements to support Ebon's load. Furthermore, there should be a minimum demand that is closer to the requested amount to receive the special rates. This will ensure that the cost of procuring the capacity for the customer will not be borne by KPCO's other ratepayers.

Finally, as part of his testimony, Mr. West indicates that there are remedies under Kentucky law if KPCO were to default prior to the conclusion of the 10-year contract.[21] However, it is unclear which laws Mr. West is referring to and how those laws can sufficiently protect KPCO's ratepayers. In response to JI-1-35, KPCO references the state's

[21] West page 13, lines 3-5.

common law and code, but objects to providing further identification of the laws that would protect existing ratepayers “in the unlikely event of a default” as “speculative.” I do not think ensuring protections for existing customers is speculative, rather it would be the Company performing its due diligence to ensure no harm is done as part of accepting the Special Contract.

While I do not recommend approval of the Special Contract, if the Commission were to grant it, then I recommend that those laws be identified in the Special Contract to clearly identify the actions in the event of default.

V. Recommendation Related to the Ebon Special Contract

Q. Do you recommend that the Commission approve the Special Contract between KPCO and Ebon?

A. No. I recommend that the Commission deny the Special Contract between KPCO and Ebon. After review of the evidence and the findings provided by Witness Hotaling, I do not believe that the Special Contract has been designed in a way that would not be harmful to existing ratepayers, it has not met the requirements of the economic development rate, and it exceeds the Commission-approved capacity cap for KPCO to offer economic development discounts. Ultimately, the evidence in the case does not establish that Ebon would be paying its fair share of the system costs related to providing the facility with electric service nor does it indicate that no harm may be done to ratepayers or the pathway to hold Ebon accountable for any harm experienced by existing ratepayers.

Q. Can you summarize the potential harm this contract may have cause to existing ratepayers?

A. Yes. Below is a list of the potential harm, including financial and environmental, to existing ratepayers if the Special Contract were to be approved.

- Financial harm in the event that the Floor Price has not been established to cover the minimum impacts of connecting Ebon to KPCO's system, as well as providing electric service over the life of the contract.
- Property tax increases related to the land leased to Ebon will be recovered through rate base, which is paid for by all ratepayers.
- Potential to increase energy prices for all ratepayers.
- Limitation on ability to offer other economic development contracts in the future due to the size of the request in the Ebon Special Contract, limiting the potential for KPCO to use this mechanism in its service territory for more substantial economic development opportunities.
- Potential opportunity cost of using the land for Ebon's facility instead of potentially for renewable generation.
- Increased greenhouse gas emissions and other pollution from the energy used by Ebon's facility, which would primarily be sourced from natural gas generation.

VI. Proposed Requirements for Evaluating Special Contracts for Crypto Mining Facilities

Q. Do you believe that crypto mining facilities should have minimum requirements when an EDR discount is provided?

A. Yes, I do. Establishing more stringent requirements for risky and volatile business operation provides protections for ratepayers and the utility itself. Additionally, it can streamline the evaluation of a special contract offering an EDR discount. Given the volatility and the potential increased risk to existing customers, the Commission should consider investment requirements related to required investments in grid infrastructure by a utility and against bankruptcy and abrupt closure of an operation. These safeguards should be related to the level of investment required by the applicant for grid infrastructure upgrades and estimated monthly billing.

Additionally, there is potential for a cryptocurrency customer to not seek the EDR discount. If this occurs, the Commission should consider requiring the same safeguards when utilities extend electric service to cryptocurrency mining operations, regardless of the tariff option.

Q. What should be considered when approving an EDR Special Contract?

A. First, given the influx of EDR contracts for cryptocurrency mining operations the Commission should consider developing a standardized application to be included with a special contract. A standardized application could provide an efficient way to evaluate all necessary requirements for approval and clearly identify the economic benefits of the EDR with supporting evidence identified. It could potentially limit the number of data requests needed to evaluate a Special Contract. The standardized application should include all elements that the Commission needs to consider extending the EDR discount, including, but not limited to, the level and types of economic development, identification of any costs associated with bringing a facility online, and any requirements placed upon the applicant by the utility, for example a surety bond.

Second, there are several elements the Commission should take into consideration when evaluating whether to approve the EDR Special Contract in addition to evidence considered in the past. These include:

- The utility has the onus of proving that absent the discount that the applicant would not move forward with locating, maintaining, or expanding its energy load within the utility's service territory.
- Any evidence provided in the EDR application, including the marginal cost analysis, should be based upon Commission-reviewed analysis that is adjusted only for known and quantifiable new information. For example, the marginal cost analysis should be based upon the most recent Commission-reviewed Integrated Resource Plan ("IRP") that is adjusted for only known capacity changes, such as an approved application for a Certificate of Public Convenience and Necessity ("CPCN"), or updated cost information.
- "EDRs should only be offered during periods of excess capacity," and "the load of EDR customers should not create a need for additional capacity."[22]
- The utility should demonstrate that no financial harm will be incurred by existing customers as a result of the EDR discount. Furthermore, there should

[22] Order, *In re: An Investigation into the Implementation of Economic Development Rates by Electric and Gas Utilities*, at 5 (Ky. P.S.C. Sept. 24, 1990).

be assurance that extending the EDR will accrue a benefit to existing customers related to fixed costs.

- The applicant should provide a good faith estimate of the economic development resulting from the project, with benefits being accrued to all three areas: jobs, capital investment, and local and state taxes.
- There should be a documented minimum level of job creation and economic development that will be achieved.
- The utility should provide annual documentation, once the special contract is approved, to prove the creation of jobs, capital investment, and taxes.
- There should be bond and investment requirements assumed by the applicant to limit the financial risk to a utility's existing customers related to not only non-payment, but also investment to transmission and distribution facilities that are required to bring the energy load online.

Q. Does the Special Contract met the requirements you recommend in this section?

A. No, it does not.

Q. Does this conclude your testimony?

A. Yes.

VERIFICATION

The undersigned, Stacy L Sherwood being first duly sworn, deposes and says that she has personal knowledge of the matters set forth in the foregoing testimony and that the information contained therein is true and correct to the best of her information, knowledge, and belief, after reasonable inquiry.

Subscribed and sworn to before me by Stacy L Sherwood this 10 day of March, 2023.

Lauryn Thomas
Notary Public

My commission expires: 12/8/2027

Lauryn Thomas
Notary Public
Iredell County
North Carolina
My Commission Expires 12/8/2027