Exhibit No. 5

Commission – Exhibit 5
Walter Rothe Statement
Local Public Hearing Exhibit-Sunset Hills
File No. ER-2024-0319

PUBLIC HEARING CASE ER-2024-0319 SUMMIT HILLS EXHIBIT by Walter Rothe

The following is the last of 3 emails I sent to Ameren with no reply. It was sent to missouricommunications@ameren.com on 25 Aug 2023. The subject was "Ameren-Missouri Looks Like It Has Moved To Import A significant Amount of Electric Power And Risks Blackouts". As seen below this was talking about when Ameren retires the Rush-Island plant, which it is now. You have since made plans for a gas peaker plant at Meramec, but that won't be complete until 2027. You have wisely moved up grid scale batteries but that won't be started until 2027 either and won't store more than 4 hours at capacity. There are additional warning in the following correspondence that need consideration:

Hello Ameren correspondent,

I am a retired electrical engineer and am concerned that Ameren's current summary sheet plan of where you expect to get our electric power, as presented, has problems. My case is presented below along with a proposed solution, and I have included issues with your Astrape simulation results. I passed this email by Brad Fortson of MoPSC and look forward to hearing your comments, what I have overlooked, or do not understand.

I believe it is very important for the public to understand if we are changing our definition of what level of electric power reliability is acceptable under severe weather and catastrophes. This change to what is acceptable is not easily seen but can be found in case 0 and 1 of your Astrape simulation (Table 3, page 16) in your 2022_ChangePreferred-Plan (CPP) pdf. It shows we are changing to a paradigm where we are no longer self-sufficient within Ameren-Missouri and also more susceptible to longer term outages from unlikely catastrophes.

Electricity providers and Lanny Nickell, executive vice president and chief operating officer of Southwest Power Pool, are mentioned in the Washington Times article of 1 Aug 2023 at: "https://www.washingtontimes.com/news/2023/aug/1/electricity-providers-beg-biden-not-shutter-power-/" warning that too quick a move off reliable power risks major energy shortfalls. He gave a real life example where with the recent heat dome in Louisianna, wind only provided 0.4% of its capability and they would have been forced to throttle electricity if they hadn't had reliable fossil fuel backup power. This was after replacing 8,000 MW of fossil fuel plants with 28,000 MW of wind during the last decade.

MISO itself forsaw problems supplying power to us with their statement for the summer of 2023 saying "the need for external (non-firm) supply assistance during more extreme demand levels will depend largely on wind energy output."

Before the Meramac Energy Center was retired the last day of 2022, from what I can gather at your web site with your 0.1 LOLE for 2022 (Astrape Case 0, CPP pdf, Table 3, page 16), we currently had the capability of getting all our peak power from within Ameren, even with reasonably excessive summer heat, stationary high pressure systems over northern Missouri, frozen wind turbines from ice storms, massive fires like that from Canada, hail damage to solar arrays, and possible but very unlikely volcanic eruption dust. But now, MISO predicts reliability issues when Rush Island Energy Center is retired, and Astrape Case 1

confirms it, showing external power needed. And from then on. I understand that is why its retirement has been delayed until 2025.

To help me verify in more detail when we are no longer self-sufficient I looked at your Factsheet where it is stated that "Ameren Missouri's generating capacity is approximately 10,000 megawatts (MW). All capacity numbers shown here reflect anticipated capacity in 2023 peak summer electrical demand." A problem with this number is that wind and solar rely on the weather and therefore their capacities do not "reflect anticipated capacity in 2023 peak summer electrical demand."

In Fig. 12 & 13 of the CPP pdf, page 19, for August, you show wind on average being about 20% capacity and solar around 33% on average, and both go to zero at times. So, during a heat dome, the maximum guaranteed power that can be put out until 2025 is the same as removing the High Plains and Atchison Renewable Energy Centers. This leaves about 9300 MW of reliable power in 2023. Your reserve required for 2023 is 17.9% and is above the estimated peak. For the 2021 peak demand day, normal weather was predicted and 7411 MW was the predicted peak demand. Using that for 2023 and adding the 17.9% reserve for 2023 you get 7411+1327 = 8738 MW. Note that the historical high of 8784 MW was close to that and occurred in 2007.

Given reasonable planning, 9300 MW seems like it will work until the Rush Energy Center is retired in 2025 when we might need (8738 - (9300-1178) = 616 MW from outside Ameren. Without batteries until 2035, 800 MW of solar can't be guaranteed to meet that deficit. And this analysis is somewhat optimistic because of old plant inefficiencies are not figured in.

From then on, it only gets worse with Venice and Sioux's 1466 MW of reliable energy being retired before or by 2030, and EV charging ramping up. Even though 1000 more MW of solar and 1000 more MW of wind is planned by that time, wind in August is very unreliable, solar is only 79% of nameplate, cuts out at night and reduces significantly at dusk and dawn.

To remain self-sufficient in energy with a 0.1 LOLE to avoid blackouts, at a reasonable cost, it seems responsible to cut out some of the wind turbines planned and use the money to put into flow battery grid-scale storage, maybe at the Meramec site, before retiring Rush Island or any other fossil fuel plant. InFluit Energy might be good to checkout. Its Gen2 system is 1/3 the cost of lithium-ion batteries, 4-5X the density, has 85% efficiency in storing and discharging extra energy from wind, solar and fossil fuel overage, is non-flammable, does not require scarce raw materials from foreign countries, and the electrolytes can be charged and stored for use when needed. It is still in development, but should be ready soon. I hope that their gen2 system will require reconditioning less often.

Your current plan basically replaces fossil fuel plants, mega Watt for mega Watt, whereas Lanny Nickell in the article mentioned above, found "Far more renewable power capacity is needed" than the 1 to 3.5 ratio they had used when replacing fossil fuel plants with wind turbines. In August, wind is on average just 20% of its nameplate capacity. Your balance with solar helps, but that is still only 79% of nameplate, and only one third of the time. So even on average, you need to replace 1000 MW with about 4500 MW to remain self-sufficient. But even that's optimistic since wind and solar go to zero at times.

Right now it looks like you are short 616 MW after Rush is shuttered and remain dependent on importing the difference from then on to prevent

blackouts. Once wind and solar energy centers are built, there is no fuel cost, so great forces will be at work to reduce fossil fuel use by throttling fossil fuel plants and operating on the edge. But clouds can go over solar arrays and wind can stop suddenly. Building wind and solar plants isn't cost effective until you have grid-scale storage that can smooth a whole days energy demands. Peak to trough during a peak day is about 2 GW and smoothing that out will make up the deficit from Rush Island.

Over 60% of consumers are going paycheck to paycheck. Raising rates is irresponsible when used to decommission fossil fuel plants in order to build out wind and solar energy centers whose electricity isn't stored. This is because, without storage, fossil fuel plants can't be throttled or shut off without risking blackouts.

After having enough wind that can be stored and discharged while a fossil fuel plant equivalent to it can be throttled up to meet the peak needs, extra wind turbines are only cost effective if you can shut down fossil fuel plants and you have storage for what is shut down, for long enough to turn on and ramp up the fossil fuel plant again.

Once you have reliable energy to meet peak needs you will be able to add as much wind as necessary to turn off fossil fuel plants provided you have enough storage to supply the difference until the plants can be started up again. But the cost of wind ought to include these storage costs.

The more you outsource your power, the more cascading failures are likely. And with longer transmission paths, there are additional energy losses and I think its important to keep in mind the unlikely but devastating added risk from huge solar ejections and unthinkable EMPs. We are counting more and more on electricity. Texas just paid close to $5000/MWh for imported electricity because of shortfalls due to lack of wind energy. They get about 25% of their energy from wind but have just incentivized building 10 GW of gas dispatchable energy. They only have about 5% solar, but this year they are adding 7.7 GW of solar, which should put solar at around 16%.

Raising electric rates significantly during peak times to solve the need to get power externally is not a good solution. For that would mean those that were least able to afford it would come home after work to a hot house.

In the Reuters commodities column: "Reduced wind generation puts Texas power system to the test" By Gavin Maguire, 21 Jun 23 https://www.reuters.com/markets/commodities/reduced-wind-generation-puts-texas-power-system-test-2023-06-21/ "Texas's ERCOT system generated roughly 25% of its electricity from wind power in 2022, according to data from Refinitiv, and is on course to increase that share to nearer 29% in 2023 following an estimated 2 gigawatts (GW) of planned capacity additions this year." "However, even with those increases in capacity, recent wind power generation totals have slumped from year-ago levels as wind speeds dropped around the southern United States."

It is interesting in this article that the last graphics presented shows gas and coal by far the biggest generators of electricity until a few years ago. And its instructive to note that coal outputs decline almost exactly matches the gas outputs increase while at the same time wind generation rose exponentially to above coal. That reaffirms to me that wind without a large amount of storage does not contribute

significantly to electric reliability. Wind and solar variations are too fast to throttle fossil fuel plants.

Your CPP pdf on pages 15-16, with the Astrape Analysis Summary, does not match the Ameren Summary Plan. You simulate adding 1205 MW of solar in Case 1, but the Simplified Summary Plan shows 800 MW of solar added at the end of 2025. Even with this extra 400 MW simulated, your LOLE shows 7 days of Loss Of Load Expectation in 10 years unless we can get imported power (696 MW from MISO). This new need for imported electric power is not shown in the Summary Plan. The Ameren Summary Plan also shows 700 MW of wind added before 2022, but Case 0 for 2022 doesn't include it, but the following Cases do. Meramec is not mentioned at all in the simulation results although Meramec was not closed till the last day of 2022. Until I did a detailed analysis I was not sure if in 2023 we currently have a 0.1 LOLE or not.

The Edison Electric Institute June 2022 report "Electric Vehicle Sales and the Charging Infrastructure Required Through 2030" estimates there will be 26.4 million EV's on the road in 2030. Extrapolating to 2037 from the 2019 energy.gov pdf "GITT ISATT EVs at Scale Grid Summary Report FINAL Nov2019.pdf", page 2, Figure 1, it looks like the number of EVs on the road in 2037 will be around 65 million. Assuming 3 million cars in Ameren's service area in 2037, assuming the same level of EV penetration in Missouri as the US in total, this gives 65*3/259 = 753000 EVs in Ameren's service area. To charge these EVs will require 3.8 MWh/year (page 3) * 753000 = 2861.4 GWh/year, or 9% more than normal. This is 0.33 GW of extra generational power. Page iv says 12 GW of capacity can supply 6 million EVs assuming random charging times. This means Ameren will need 1.5 GW of extra capacity by the start of 2037 above what it takes to replace lost coal and other reliable plants.

To help the consumer understand your tradeoffs, I think you need to update your summary sheet showing the amount of power that might be needed externally, during summer and winter. Possibly showing estimates of how many MW are needed, with historic minimal wind and solar during estimated peak needs, along the timeline. It would also be useful to know what external regions have a plan that expects to be able to supply the total worst peak at those times and to specify your acceptable frequency of rolling blackouts.

As a side-note, it might be wise to consider that any solar arrays that are planned should be certified to be able to survive an EMP, if at all possible. And we should develop a capability to build transformers in the US and increase the number in stock at any time that might be destroyed by building out residential EV charging, extreme solar flares, and plausible catastrophes like EMPs. Solar arrays should have a way to be quickly shielded from hail damage.

I personally believe in the 2030's that nuclear fusion plants will come online which will make CCS, nuclear fission, and hydrogen turbines irrelevant. Microsoft has contracted with Helion Energy for 50 MW of nuclear fusion power in 2028 and several nuclear fusion prototype plans expect to have "breakeven" within the next 5 years. Helion expects 1 cent/kWh in the long term. It seems wise to me to hold off going carbon capture, hydrogen turbines, nuclear fission, and extra wind/storage above peak needs until at least 2029 to know if nuclear fusion is practical.

Thanks for your consideration,
Walter Rothe