Exhibit No. 41

Ameren Missouri – Exhibit 41
James D. Huss
Rebuttal Testimony
File Nos. ER-2021-0240 & GR-2021-0241

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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. ER-2021-0240

REBUTTAL TESTIMONY

OF

JAMES D. HUSS

ON

BEHALF OF

UNION ELECTRIC COMPANY

D/B/A AMEREN MISSOURI

St. Louis, Missouri
October 15, 2021

TABLE OF CONTENTS

REBUTTAL TESTIMONY

OF

JAMES D. HUSS

FILE NO. ER-2021-0240

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is James D. Huss. My business address is One Ameren Plaza, 1901 Chouteau Ave., St. Louis, Missouri.

Q. By whom are you employed and what is your position?

A. I am employed by Union Electric Company d/b/a Ameren Missouri ("Company" or "Ameren Missouri") as Director Operations Excellence.

Q. Please describe your educational background and employment experience.

A. I am a registered professional engineer with the state of Missouri. I have a Bachelor's and Master's degrees in Electrical Engineering from University of Missouri – Columbia. I joined Union Electric Company in 1991 and worked at the Callaway Nuclear Plant in electrical design engineering and was responsible for various plant systems and modifications until 1995. Beginning in 1995, I worked as a Distribution Operating Engineer with responsibilities for substation operations, SCADA, metering, and power quality and reliability. In 2008, I was promoted to a Supervising Engineer in the Distribution Operating organization. In that role, I was responsible for the formation and oversight of a Distribution Systems Technology team that designed, installed, and maintained a variety of smart grid equipment including switching devices and sensors. In

2014, I was promoted to Senior Manager, Distribution Operating with responsibility for operation and oversight of the St. Louis and Jefferson City Distribution Control offices and the SCADA engineering team. I was promoted to Director, Distribution Operating with responsibilities including the two Distribution Control offices, Metro St. Louis first responders, SCADA Engineering, and Distribution System Technology in 2015. In 2019, I transferred to the Director, Operations Excellence and I was assigned oversight of Distribution System Planning, Distribution Construction Standards, Joint Use, Damage Prevention, SCADA/ADMS engineering, and oversight of capital allocations and project selection and execution for Ameren Missouri.

Q. What are your responsibilities in your current position?

A. My primary responsibilities are System Planning, Engineering Standards, and oversight of the five-year capital budgeting and forecasting process for Ameren Missouri's Energy Delivery function.

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to address the Office of Public Counsel ("OPC") witness Dr. Geoff Marke's request in his direct testimony that the Company address why it has not included a voltage optimization plan similar to that of its affiliate, Ameren Illinois Company ("Ameren Illinois"), in its smart grid investments.

II. VOLTAGE OPTIMIZATION GENERALLY

Q. Did you review Dr. Marke's direct testimony regarding a voltage optimization plan?

A. Yes.

Q. What does Dr. Marke recommend?

A. Dr. Marke states he supports a voltage optimization plan as part of Ameren Missouri's grid investment plan and points out that Ameren Illinois has a Voltage Optimization program. Dr. Marke would like the Company to explain why Ameren Missouri does not have a voltage optimization plan similar to Ameren Illinois' Voltage Optimization Plan ("VO Plan").[1]

Q. How does Dr. Marke describe Ameren Illinois' Voltage Optimization plan?

A. Dr. Marke does not provide an explanation of Ameren Illinois' VO Plan or indicate whether there are similarities between Ameren Illinois' and Ameren Missouri's electric systems. Dr. Marke's recommendation assumes Ameren Illinois' VO Plan would produce the same benefits in Missouri as Illinois. As I discuss below, that is a poor assumption.

Q. Please explain why Ameren Illinois implemented a Voltage Optimization Plan.

A. Ameren Illinois implemented its VO Plan under Section 8-104B(b-20) of the Illinois Public Utilities Act ("PUA"). The PUA allows Ameren Illinois to include cost-effective voltage optimization measures in its energy-efficiency and demand response plan. Ameren Illinois' VO Plan was based on a pilot test on four circuits in 2012 and 2013 that evaluated the CVR factor[2] associated with each circuit.[3] The pilot confirmed the CVR potential in the Ameren Illinois service territory (based on the four circuits) and established

[1] File NO. ER-2021-0240, Direct Testimony of Geoff Marke, PhD., on behalf of OPC, p. 15, ll. 22-25.
[2] The "CVR factor" is a measure of how much energy consumption is reduced as voltage is lowered.
[3] *See* ICC Docket No. 18-0211, Ameren Ex. 1.0 and 1.2.

a CVR factor of 0.8 for use in measuring the impact of the voltage optimization measures. Ameren Illinois' VO Plan includes a selection of VO investments for feeder level deployment operating at 20 kV or less. The Illinois Commerce Commission found the plan reasonable and approved the VO Plan in Docket No. 18-0211.

Q. How does Ameren Illinois control the system voltage levels today?

A. Differently than Ameren Missouri does. Ameren Illinois[4] does not use Load Tap Changers ("LTCs") to regulate voltage at the substation transformer and instead, Ameren Illinois heavily relies on voltage regulators and capacitor banks downstream of the substation on the circuits to regulate voltage. In contrast, Ameren Missouri controls the voltage at the substation while Ameren Illinois controls voltage at the circuit level. Due to this system design, Ameren Illinois sets its normal operating voltage at its substations at 125V, which is higher than Ameren Missouri. I address the use of LTCs later in my rebuttal testimony.

Q. How does this system design difference impact Ameren Illinois' deployment of its VO Plan?

A. Since Ameren Illinois relies on voltage regulation on individual circuits as opposed to at the substation, its VO Plan fits with the operating design of its distribution system and allows Ameren Illinois to apply its VO Plan to only the individual circuits with the best benefit potential, instead of including all the circuits on a substation, which Ameren Missouri does. Ameren Illinois' VO Plan utilizes the voltage regulators and

[4] Ameren Illinois' distribution system is comprised of legacy Illinois utilities (Central Illinois Public Service Company, Central Illinois Light and Power Company, and Illinois Power), which merged with, or were acquired by Ameren Corporation over the past twenty-plus years. The designs and operations of the Illinois legacy utilities are different in certain respects, including the reliance on LTCs, from Ameren Missouri's system.

capacitor banks already installed on its distribution system, with the addition of communication control devices, to actively adjust the voltage downstream of the substation on the circuit as designed by the voltage optimization control system. Additionally, this operating design allows Ameren Illinois a larger potential benefit from voltage optimization as it is starting from a higher baseline compared to Ameren Missouri.

Q. Would you expect a voltage optimization program to provide the same results for Ameren Missouri as it does for Ameren Illinois?

A. No, for several reasons, including how voltage is controlled on each system, the substation voltage differences between the systems, and for other reasons I discuss further below.

Q. What is the first of those other reasons?

A. Ameren Missouri has tested the voltage reduction concept from time-to-time over the past 20 years, including just a few months ago. Specifically, on February 14, 2021, the Ameren Missouri service territory experienced a severe cold spell ("February 2021 Event"). Ameren Missouri executed a 2.5% voltage reduction at its Horseshoe Bend substation in an area with a representative concentration of electric space heating to address a potential overload condition. However, due to the customer load characteristics, the 2.5% substation voltage reduction only resulted in a 0.4% load reduction, which equates to a CVR factor of just 0.16. This is only 20% of the CVR factor applicable for Ameren Illinois. Additionally, more than 20 years ago (on July 29, 1999) Ameren Missouri used voltage reduction due to generation shortfalls on the overall system. A 2.5% voltage reduction was applied to the system and resulted in a CVR factor of only approximately 0.4, which is half of the Ameren Illinois factor.

Q. Do you have an opinion regarding why the observed Ameren Missouri CVR factors are different from Ameren Illinois?

A. First, Ameren Illinois measured its CVR factor for their VO Plan in 2012 and 2013,[5] a time when incandescent lighting was more widely used by customers than today. Incandescent bulbs are a purely resistive load, which means when voltage is reduced, power is reduced and the only impact to customers is a slightly dimmer light (i.e., the light output is reduced more than the energy saved). Lighting at 60W and 100W per bulb accounted for a fairly steady percentage of customer electric usage in the early 2000's. This resistive load has since been replaced. First with CFL, and now with LED lighting, which uses a fraction of the energy, and will not see energy reduction when reducing voltage. They are engineered to operate as a constant power load and will draw more amps if voltage is reduced to achieve the same output**.**

Second, while only about 14% of Illinois residents use electricity for heating, about 30% of Missouri residents use electricity for heating.[6] This is important because these space heating loads are primarily thermostatically-controlled resistive loads. If they are supplied at a lower voltage, they will not consume less energy because the heating appliances will simply need to run longer to produce the same amount of heat (i.e., to kick off the thermostat).[7] The same is true for both water heating and electric cooking. In Missouri, space and water heating represents close to 60% of the state's energy consumption. A voltage optimization program would have little or no impact on the energy used for these load types.

[5] See GM 3, p. 10.
[6] Estimates based on U.S. Energy Information Administration 2009 residential state-wide energy consumption study.
[7] Heat output = Voltage x Amps of the heater x time.

Q. You mentioned earlier that LTCs are used by Ameren Missouri but not by Ameren Illinois, and that this impacted the effectiveness of voltage optimization. Please elaborate.

A. As noted, Ameren Missouri utilizes substation transformers with LTCs. The LTCs regulate the substation bus voltage within an allowable range (121.5V to 124.5V) which is then provided to all of the circuits fed from the substation bus. These guidelines allow for voltage drop in the system such that the voltage is at least 114V at the point of utility interconnection to the customers' premises. These standards account for voltage drop that naturally occurs in the high voltage primary and secondary circuits between the substation and the load. If Ameren Missouri were to further reduce the voltage at the substation, it would need to install a number of devices downstream on the circuits, primarily line voltage regulators and capacitor banks. This would be in order to counteract the voltage reduction at the substation and boost the voltage back up into the allowable voltage ranges defined by state and industry standards. Providing power at voltages outside the allowable range would force customers to operate their equipment at voltages for which the equipment was not designed, risking mis-operation or damage to the equipment.

Q. Can Ameren Missouri target voltage optimization only on circuits with low- to moderate- income customers, as Dr. Marke suggests?

A. No. As previously described, since Ameren Missouri typically controls distribution system operating voltage via LTCs on substation transformers, all feeders served by a substation would need to be equipped for voltage leveling if voltage optimization were employed. All customers served by a substation would be affected by the deployment of voltage optimization. Since substations are not situated to serve only

low- to moderate-income customers, it is not feasible to target only low- to moderate-income customers for the deployment of voltage optimization. And while I am not an attorney, it is my understanding that investing in the equipment needed to gain circuit-by-circuit control of voltage only on circuits that might serve only low- to moderate-income customers (if we could even identify such circuits), may raise concerns of undue discrimination in violation of Missouri law.

Q. What were the estimated costs of a voltage optimization program in Missouri?

A. While we do not have refined estimates, we have done some sampling of substations and circuits and applied engineering assumptions to come up with a rough estimate that it would cost nearly $100 million to implement a voltage optimization program throughout Ameren Missouri's electric distribution system. In addition to the initial capital investment, we roughly expect that a voltage optimization program would require approximately $2 million of incremental maintenance expenses on an annual basis for the life of the program. The primary driver of this is the labor costs to monitor and operate software needed to control the system, and to install and maintain the capacitor banks and regulators that would have to be added.

Q. Based on the above discussion, do you have an opinion regarding whether implementing a voltage optimization program in Missouri would be a good use of customer funds?

A. Yes, my opinion is that it would not be. As incandescent light bulb use continues to decline or be eliminated entirely, savings opportunities from voltage optimization will also continue to decrease. The composition of loads in Missouri versus

Illinois also lowers the potential for benefit from voltage optimization in Missouri. CVR factors like the 0.16 factor we witnessed when we last employed voltage optimization for other reasons are very poor and don not justify the investments needed to pursue a voltage optimization program. As discussed in Ameren Missouri witness Mark Birk's rebuttal testimony, we have more needed projects to address foundational needs of the system and otherwise prepare it for future grid needs than we have investment dollars each year, and I do not support diverting those dollars to a voltage optimization program that, at best, might deliver some marginal benefits.

Q. Does that conclude your rebuttal testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of Union Electric Company d/b/a Ameren Missouri's Tariffs to Adjust Its Revenues for Electric Service.	)))	Case No. ER-2021-0240

AFFIDAVIT OF JAMES D. HUSS

STATE OF MISSOURI)
) ss
CITY OF ST. LOUIS)

James D. Huss, being first duly sworn on his oath, states:

My name is James D. Huss, and on his oath declare that he is of sound mind and lawful age; that he has prepared the foregoing *Rebuttal Testimony*; and further, under the penalty of perjury, that the same is true and correct to the best of my knowledge and belief.

/s/ James D. Huss
James D. Huss

Sworn to this 15th day of October, 2021.