



Smart Meter Program Report

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SMART METER PROGRAM REPORT

Background

On September 1, 2018, Ameren Missouri ("Company") filed its notice to elect Plant in Service Accounting ("PISA") pursuant to Section 393.140.5, and subsequently filed its required Capital Investment Plan on February 14, 2019, which it refers to as its Smart Energy Plan ("SEP"). The SEP includes planned investment in Advanced Metering Infrastructure ("AMI") which will be deployed as a part of Ameren Missouri's Smart Meter Program ("SMP"). In this report, the Company describes its SMP and certain variances from Commission rules and tariff modifications that it requests the Commission grant to enable the SMP move forward in a manner that maximizes customer benefits from the SMP.

By way of background, the Company currently utilizes Automated Meter Reading ("AMR") technology on its system, facilitated through a contract with the metering vendor Landis+Gyr ("L+G"). The meters associated with this technology feature one-way communication that allow L+G's network to retrieve meter reads remotely. At present, the Company owns the meters that are installed on customer premises, but L+G owns the AMR communications network. The Company pays L+G a contractual fee for meter reading services over that network based on the number of AMR meters currently deployed on the system. The Company was an early adopter of AMR, rolling out the meters beginning in 1995. At that time, remote meter reading capability was very new and allowed the Company to revamp a previously labor intensive process, whereby meter readers visited every meter on the system monthly. As a result of that conversion, the Company's customers have reaped benefits in the form of lower operations and maintenance ("O&M") expenses related to meter reading for decades. The AMR

system, however, is nearing the end of its useful life. The meter reading contract between the Company and L+G expires at the end of 2020, and L+G will no longer support the technology that enables the AMR network to operate after 2025. AMR technology is simply becoming more expensive to maintain and will soon be obsolete as a result of the more advanced generation of meters and communications equipment known as AMI. The Company, therefore, must replace its AMR system prior its ultimate obsolescence.

Ameren Missouri's Smart Meter Program

The Company has elected to replace its AMR meters and network with L+G's AMI meters and networking equipment. AMI meters have additional capabilities and functionality beyond the existing AMR meters, including bidirectional communication with the meter, enhanced meter data collection with operation benefits, and more flexibility in customer program offerings. The Company's SMP creates an enterprise solution that leverages shared data center infrastructure, baseline process designs, existing systems, and software currently used by Ameren Illinois.

The AMI meters that Ameren Missouri will be purchasing from L+G are the Series 5 Focus AXe for small commercial and residential applications and the S4x for large commercial and industrial applications. Over one million of the total meters purchased will be the Focus AXe form 2S with service disconnect capability ("standard residential meter"). The standard residential meter is a solid-state meter with an integrated meter board, meaning that it has fewer components, making them less expensive. Additionally, all meters deployed as a part of the Company's SMP will capture significantly more data points that can be used by the Company to provide customers with more granular energy usage data, while also improving service reliability and outage experiences. This new data includes usage information, 15 minute interval data,

voltage, temperature, and current, for each meter. AMI meters will automatically communicate their information up through the system every 4 hours (6 times daily), but can also be remotely interrogated in the event the Company needs to access the meter's information.

The AMI network that the Company will be installing across the service territory will also be L+G's most up-to-date technology and will be deployed using latest industry best practices and open standards. As an example, the network products utilized, N2450 Network Gateway and the R650 Network Router, will communicate using a standards based communications protocol. This approach will ultimately allow for hardware interoperability and reduce risk to the Company, enabling the Company to utilize any network components from any manufacturer that also complies with the open standards. The AMI network will be built with operating performance in mind, and will be designed with an efficient architecture that will decrease communication latency, and increase throughput capability. Next, the system will allow for future use cases beyond metering that may provide additional benefits beyond those described in this report as arising from the SMP. Those additional use cases have not been defined and are not currently part of the Company's SMP. Such future use cases utilizing the AMI network may include equipment such as pole tilt sensors, fault circuit indicators, and automated streetlight technology.

An Integrated Operations Center ("IOC") will be developed to maintain and monitor the AMI system and all of its network and metering components. Personnel housed at the IOC will not only ensure the operation of the AMI system through remote monitoring and maintenance activities, but will also be a support mechanism for field processes such as network device and meter replacement activities. The IOC personnel will also play a role in storm response, other outage situations, and provide other operational support as necessary. The team will funnel

useful AMI system data to operating groups that will enable quicker response to outages and more educated system improvement decisions.

SMP Benefits

The deployment of AMI meters and their enhanced functionality is expected to provide numerous benefits to customers, both in terms of cost savings and service enhancements.

Specific categories of benefits customers may realize as a result of the SMP include:

- Reduced ongoing O&M expense levels relative to the current metering solution (AMR).
Replacing the current L+G AMR meter reading contract with an L+G facilitated solution owned and operated by the Company will ultimately result in O&M expense savings per meter reading of approximately 35%. This is expected to save \$252 million over fifteen years. As each AMR meter is replaced, O&M expense reductions will be realized contemporaneously under the existing AMR meter reading contract with L+G.
- AMI meters allow remote connections and disconnections of service. The Company currently contracts with a vendor to perform these activities at a cost of approximately \$3 million per year. Automated functionality will ultimately dramatically reduce truck rolls that are required to perform these activities manually, allowing for the phase out of that third party contract over time. This will ultimately save money and enhance safety. Reduction in truck rolls related to the remote connect/disconnect functionality is estimated to save approximately \$43 million over 15 years.
- AMI meters facilitate revenue protection through detection of theft of service, reduced consumption on inactive meters, and increased efficiency of the disconnect/reconnect process, saving an estimated \$1 million per year.

- AMI meters improve outage detection and notification, allowing the Company to respond with more precision to outages and provide the customer with more information about the status of their outage. In addition, each meter captures momentary outage data, allowing the Company to proactively identify and analyze this data to better understand how momentary outages are affecting customers.
- AMI meters, network equipment, and associated business processes will be monitored by the Company's IOC. The IOC ensures the overall health of the AMI system, and that timely response to critical events and scheduled work is achieved. As part of the project, the Company's IOC will expand to provide monitoring and support services to support the SMP.
- AMI meters can enable the Company to offer customers more rate options, as the meters do not need to be replaced or reprogrammed to accommodate different Time of Use ("TOU") periods or to capture other potential billing components. As a result, the Company has proposed new TOU rate options for residential customers in its pending rate case (File No. ER-2019-0335).
- AMI data will allow the Company to present customers with more detailed and timely usage information, providing insights regarding new and different ways that customers may be able to change energy consuming habits to manage their bills, respond to new rate options, and engage in energy efficiency and demand response programs.
- In the future, smart devices (thermostats, EV chargers, appliances) may be able to receive signals from meters related to prices or demand response events that could be used to automate load shifting to benefit the system and reduce customers' bills.

- AMI meters provide enhanced voltage monitoring capabilities which may allow for future voltage optimization programs to improve efficiency of energy delivery on the system
- AMI meters provide enhanced data collection of alarms, flags, and events ("AFEs"), notifying the Company and customers to potentially unsafe conditions. Further, the AMI meters monitor the temperature of the meter base, identifying when loose connections or other wiring issues may be present causing increased electrical resistance. Over 300 distinct AFEs are available on the meters to relay operational and safety events to the Company.
- Additional benefits attributable to AMI meters will become apparent over time as a result of increased amount, quality, and timeliness of data gathered by the meters.

Project Schedule and Budget

The scope of the SMP includes a total of \$392 million of investment over seven years related to gas and electric meter equipment, software development and procurement, network and meter deployment, and the construction of a new meter lab and expanding the meter shop. As part of the SEP the Company's SMP is subject to an annual spending cap of six percent of the total Ameren Missouri capital spending plan, due to specific provisions of Senate Bill 564. The breakdown of the \$392 million plan is shown in Figure 1 below:

Figure 1: Smart Meter Plan Expenditure Detail

Project Expenditure (in millions)	Capital	Contingency	O&M	Total	% of total
Digital	\$50.9	\$3.6	\$0.7	\$55.2	14.1%
Meter & Install Costs	\$202.0	\$20.8	\$0.0	\$222.8	56.8%
Meter Shop/Farm	\$3.2	\$0.3	\$0.0	\$3.5	0.9%
Network Install	\$27.3	\$4.4	\$0.0	\$31.7	8.1%
Network Lab	\$0.2	\$0.1	\$0.1	\$0.3	0.1%
Team & Facility	\$40.4	\$0.5	\$3.4	\$44.3	11.3%
Indirect OH	\$27.9	\$0.00	\$0.00	\$27.9	7.1%
AFUDC	\$6.7	\$0.00	\$0.00	\$6.7	1.7%
Project Total	\$358.6	\$29.7	\$4.2	\$392.4	100%

By 2025, all of the approximately 1.2 million electric meters¹ on the Company's system are scheduled to be upgraded to AMI equipment and functionality. The current meter deployment schedule is projected to run from 2020 through 2025, with meters installed according to the pattern illustrated in Figure 2 below:

Figure 2: Yearly deployment schedule (% complete including Electric and Gas)

2020	2021	2022	2023	2024	2025
10%	28%	47%	65%	83%	100%

¹ The Company's approximately 130,000 gas meters will also be upgraded with AMI enabled communication modules by 2025. The subject of this filing relates only to the electric meters included in the SMP.

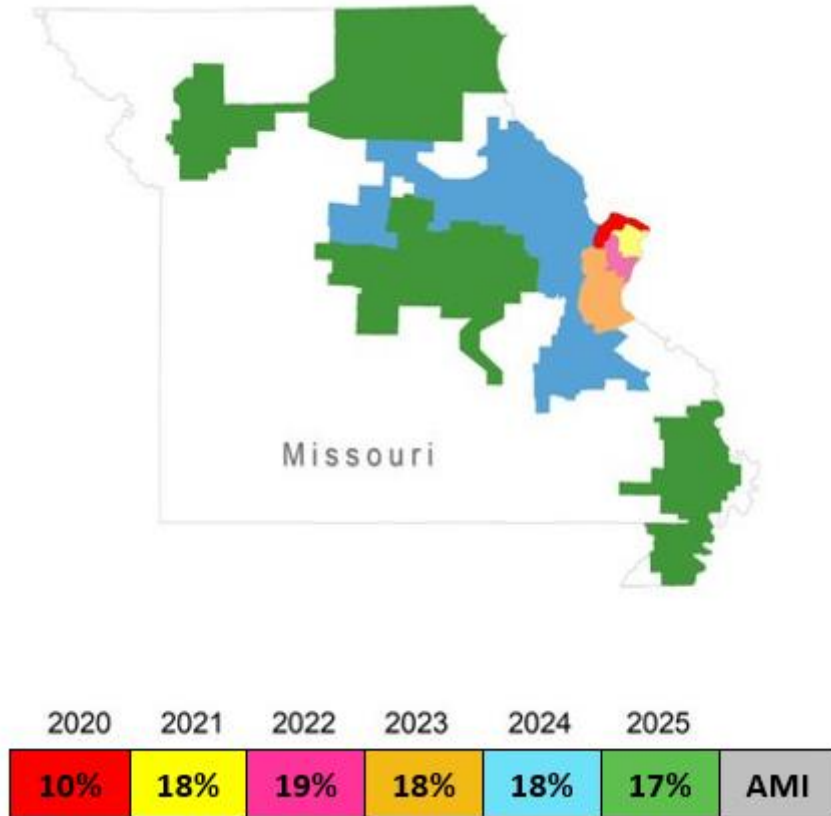
Meter deployment will begin in 2020 in St. Charles, and will proceed geographically throughout the service territory, moving first through the more densely populated portions of the service territory in St. Louis City and County, followed by the smaller population centers and more rural areas. Addressing the more densely populated areas first will maximize the initial utilization of the AMI network and reduce the number of AMR meters in service, which will reduce AMR-related O&M expense as quickly as possible in a manner that will ultimately be reflected in customer rates. The geographic rollout plan is shown in Figures 3 and 4 below:

Figure 3: AMI Electric and Gas Deployment Schedule by Operating Center

#	Service Center	Deployment Year
1	St. Charles	2020
2	Berkeley	2020-2021
3	Geraldine	2021
4	Underground	2021
5	Mackenzie	2021-2022
6	Dorsett	2022-2023
7	Ellisville	2023
8	Jefferson	2023
9	Franklin	2023
10	St. Francois	2023-2024
11	Potosi	2024
12	Wentzville	2024
13	Louisiana	2024
14	Mexico	2024
15	Moberly	2024
16	Boonville	2024

#	Service Center	Deployment Year
17	Columbia	2024
18	Jefferson City	2025
19	Lakeside	2025
20	Eldon	2025
21	Rolla	2025
22	Cape Girardeau	2025
23	Charleston	2025
24	Dexter	2025
25	Portageville	2025
26	Hayti	2025
27	Caruthersville	2025
28	Steele	2025
29	Kirksville	2025
30	Brookfield	2025
31	Excelsior Springs	2025

Figure 4: AMI Electric and Gas Rollout Map



Purpose of Filing

With this filing, the Company is providing some basic information about SMP, and some specific information and evidence on certain topics, in order to document and support its request for variances from certain Commission rules and for certain tariff changes. The rules and tariff provisions referenced in this report generally were written prior to the advent of AMI technology, and therefore did not contemplate the technological capabilities that would be enabled by these meters. Variances from these rules and revisions to these tariffs will enable the Company to utilize enhanced metering capabilities that provide lower costs and/or better service to customers. Specifically, the report supports the following proposed rule variances, tariff revisions reflecting the variances and other tariff revisions:

- A variance from 20 CSR 4240-13.050(9), which requires Company employees to announce their presence on site when performing service disconnections, and corresponding changes to the Company's General Rules and Regulations Tariff Sheets No. 143 and 144.
- A variance from 20 CSR 4240-13.020(9)(A), which requires starting and ending meter readings to be shown on all residential customer bills.
- Variances from 20 CSR 4240-13.020(2)(A)3, 20 CSR 4240-13.020(3), and 20 CSR 4240-13.040(3), which all relate to customers' ability to self-supply meter readings to the Company, and a corresponding change to Ameren Missouri's General Rules and Regulations Tariff Sheet No. 130.
- Tariff language intended to document new estimation routines that will be employed when estimates of usage are required for billing purposes.
- Tariff language intended to clarify conditions and charges contained in Company's tariffs pertaining to remote meter reading "opt-out."

Door Knock/Hanger During Disconnect

The first variance requested relates to this requirement found in 20 CSR 4240-13.050(9):

Immediately preceding the discontinuance of service, the employee of the utility designated to perform this function, except where the safety of the employee is endangered, shall make a reasonable effort to contact and identify him/herself to the customer or a responsible person then upon the premises and shall announce the purpose of his/her presence. When service is discontinued, the employee shall leave a notice upon the premises in a manner conspicuous to the customer that service has been discontinued and the address and telephone number of the utility where the customer may arrange to have service restored.

This provision was drafted at a time when the capability of remote connection and disconnection of service was not contemplated, as is evident by the reference to the employee designated to perform the discontinuance announcing their presence. If the employee that

performs the function is remotely located at an office miles away from the affected premises, clearly they cannot knock on the door or otherwise announce their presence, since they are not in fact present. However, the capability, enabled by the AMI meter and network, to perform this activity remotely has a number of significant benefits for customers. For example, today, without remote disconnect/reconnect capability, the Company must dispatch a truck to perform each disconnection of service, and then again to reconnect the service if and when that becomes appropriate. The resources required to perform two truck rolls to first discontinue service and then restore service, when considered in the context of the number of such service calls the Company makes in a year, represent a significant cost that is ultimately paid for by customers. The Company completes approximately 100,000 disconnects and reconnects annually, and expects to ultimately realize cost savings of approximately \$3 million annually as a result of automating this process.

Beyond the cost savings, however, there are other benefits in the form of improved safety, both for employees of the Company and customers. The Commission rule even alludes to the safety issue, making an exception "where the safety of the employee is endangered." In fact, this is a real issue. There are routinely instances where the presence of dogs in the yard, or even direct threats made by residents themselves, puts the Company's workers potentially in harm's way. The Company's security team manages over 200 threats and security concerns from customers annually. These types of security concerns include customers threatening the Company's employees or contractors that may require access to their property, threat of dog release, threat of weapons, etc.

Finally, remote disconnects and reconnects allow for a far more efficient and convenient process. To the extent that service is discontinued for a legitimate reason such as non-payment, if

a customer remedies their delinquent account by making a payment, service can be restored extremely quickly. As an example, Ameren Illinois² experienced a situation where service was disconnected for nonpayment, payment was made and the customer's service was reconnected all within ten minutes. And for scheduled service calls – whether they are for discontinuance of service to a customer who moved out or initiation of service for a customer moving in - the activity can be performed at a scheduled time, even during evenings or on weekends, based on the customer's needs. Customers do not have to wait for a service technician to arrive within a pre-defined window of time, but rather can count on a more timely and efficient process than a manual connection/disconnection could ever provide.

At present, the Company's tariffs provide for a \$30 fee to be paid for reconnection of service. This fee imposes costs on customers, many of whom are already struggling to pay their bills. The magnitude of that cost to customers is an unfortunate necessity of the current circumstance, where the Company is incurring material incremental costs to perform the reconnect activity specific to that customer. The fee mitigates the impact of the cost of providing that service on all other customers. However, the remote disconnect/reconnect capability of AMI meters significantly reduces the cost of the disconnect/reconnect process. As a result, the Company proposes to reduce the reconnection fee for customers served through an AMI meter to \$10. The Company expects to still incur some reconnection costs – both administrative costs and potential truck rolls when the automated disconnection or reconnection fails. However, we do not yet have experience with those costs to know their eventual magnitude. The \$10 proposed fee, though, represents a two-thirds reduction against the current \$30 fee that is a reasonable expectation of the cost reductions that will be realized. The appropriate level of this fee can be

² Ameren Illinois is nearing completion of its smart meter deployment.

reevaluated again in the future when the Company has more experience with the remote disconnect/reconnect process. This \$20 reduction in the cost of a reconnection is a potentially significant benefit that will accrue directly to customers that are impacted by this issue – a benefit that presumably has substantially greater value to the disconnected customer than a door knock and/or door hanger. This is especially true when other communications channels available today are more than sufficient to deliver information about a pending or recently completed service disconnection.

Currently, customers receive numerous communications from the Company in advance of disconnection, including multiple communications that are not required in the Commission's regulations. Figure 5 below shows the communications³ that occur before disconnection, with communications required by 20 CSR 4240 Chapter 13 highlighted in green:⁴

Figure 5: Customer Communications Prior to Service Disconnection

GENERAL TIMING	ACTION	DELIVERY METHOD
BEFORE PAYMENT DUE	5 days before payment due date	Email/text sent to customer
	Amount due and due date posted	Message on online account dashboard including amount due and due date, in blue
		Billing statement includes reminder of any past due amounts and notification of potential disconnection
AFTER PAYMENT DUE	Day after due date/delinquent date, a past due alert will be sent	Email/text sent to customer
	Amount remains past due	Message on online account dashboard, including amount due, in red

³ All communication is made using the available contact information.

⁴ While the Cold Weather Rule (20 CSR 4240 13.055) is cited in Figure 5, its requirements are only applicable during certain time periods.

GENERAL TIMING	ACTION	DELIVERY METHOD
	Account sent to collections	Message on online account dashboard, in red
3 DAYS AFTER DELINQUENT DATE	Late Payment accessed on account	Message on online account dashboard
	Payment received (then no further action below)	Email /text to customer
BEFORE DISCONNECTION	Notice provided 10 days prior to disconnection	Pink disconnection notice provided by mail (20 CSR 4240-13.050(5), (7) and 20 CSR 4240-13.055(3)(A))
	Disconnection message	Email/text sent to customer (sent the same day the notice is mailed)
	Account status update	Message on online account dashboard, in red
	4 days/96 hours prior to disconnection	Two phone call attempts (20 CSR 4240-13.055(3)(B))
DISCONNECTION	Disconnection occurs	Pink door hanger left at premises (20 CSR 4240-13.050(9) and 20 CSR 4240-13.055(3)(C), which incorporated 13.050(9) by reference)
		Email/text sent to customer
		Message on online account dashboard
	Payment insufficient to cancel disconnection	Email/text sent to customer
NO DISCONNECTION	Payment received sufficient to cancel disconnection	Balance updated on online account dashboard
		Email/text to customer
RECONNECTION	Reconnection occurs if payment sufficient after disconnection and account is not in Final status.	Message on online account dashboard
		Email/text sent to customer

The only exception the Company is requesting be made to the Commission-required disconnection notices provided above is the in-person communication specifically for the disconnection itself; all other notice provisions, including the voluntary notices, will remain intact. Additionally, in place of the notice required by 20 CSR 4240-13.050(9), the Company will add an additional communication occurrence on the day of disconnection by telephone or alternate channel (text/email) based on customer preference for those customers that have enrolled in the Company's alerts program and selected a preferred communication channel, and if no preference has been selected the default method of contact will be via telephone.

The capability to remotely disconnect and reconnect service is a true win-win benefit of AMI meters. It creates a substantial economic benefit in the form of lower costs that will ultimately accrue both to specifically impacted customers through a reduction of the reconnection fee, and the broader customer base that shares in those costs as they are reflected in base electric rates. Beyond the economic impacts, however, AMI's remote disconnect/reconnect capability eliminates potential hazards and safety issues that are real challenges for the Company's employees and contractors. In short, discontinuing the in-person component of disconnection and reconnection enables both economic and safety benefits for both the Company and its customers.

TOU Register Billing

The second variance requested relates to this requirement found in 20 CSR 4240-13.

020(9):

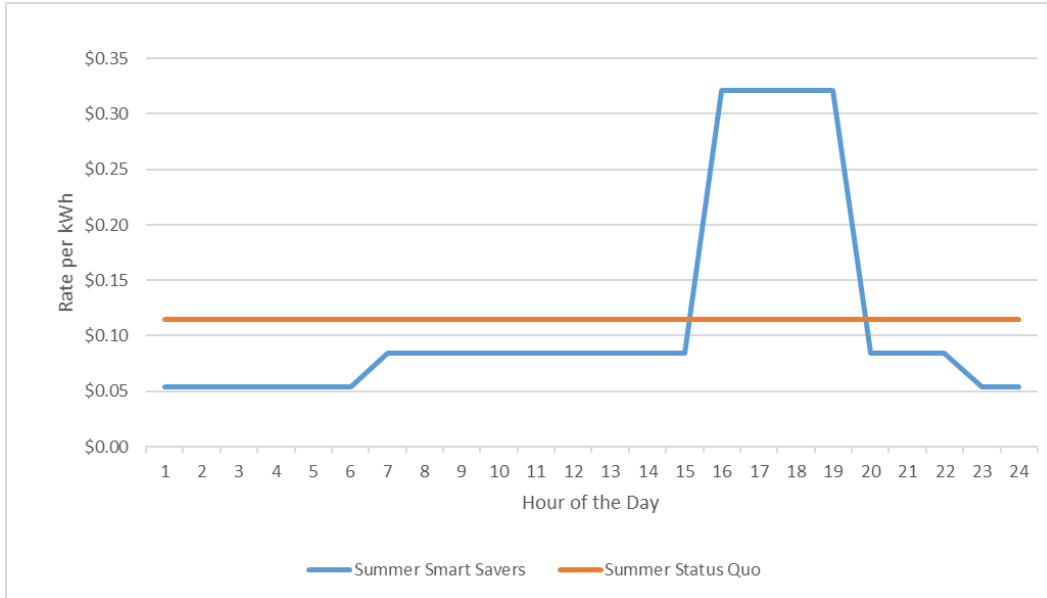
Every bill for residential utility service shall clearly state— (A) The beginning and ending meter readings of the billing period and the dates of these readings.

Today, all of the Company's residential bills do include this information. However, this is in part an artifact of legacy metering technology that relies primarily or exclusively on

"snapshot" meter readings. As the rule implies, there is a reading at the beginning of the billing period, a reading at the end of the billing period, and the energy consumption is simply derived by taking the difference between the two. This paradigm is expected to change with the advent of AMI meters. Each meter will record consumption in fifteen minute intervals. As a result, energy consumption for a billing period can be built up by summing individual interval readings, rather than by simply taking the difference between a beginning and ending reading. AMI meters, of course, will also still be able to generate beginning and ending meter readings for a billing period. And due to this fact, the majority of residential bills will still reflect those readings in a manner that is consistent with the Commission's rule.

However, the interval readings delivered by AMI meters also will enable the billing of more complex rate structures, such as TOU rates. TOU rates apply different prices at different times in the billing period. Ameren Missouri has proposed two new TOU rates in its ongoing electric rate case. The first it refers to as its "EV Savers" rate, which is targeted toward customers who own electric vehicles ("EV") and want to save money by charging them overnight. The second is referred to as the "Smart Savers" rate, and it is designed for a more engaged customer who is interested in actively managing energy usage to reduce their bill. To illustrate, Figure 6 below shows the Smart Savers summer weekday rate structure proposed in File No. ER-2019-0335 relative to the status quo flat summer rate:

Figure 6 – "Smart Savers" TOU Rate by Hour of the Day vs. Flat Rate



The Smart Savers summer rate applies a different per kilowatt-hour ("kWh") charge to usage in three different hourly groupings: 3-7 p.m. on non-holiday weekdays (on-peak), 6 a.m. to 10 p.m. every day excluding on-peak hours (intermediate), and overnight hours from 10 p.m. to 6 a.m. (off-peak). To properly bill usage for a customer that chooses this rate structure, the usage must be accumulated for the proper hours prior to application of the appropriate rate. While both AMR and AMI meters can be programmed to take "snapshot" reads according to pre-defined TOU schedules, use of such an option is not preferred for most TOU applications, and may not even be possible for some more complex TOU rates such as the Smart Savers rate. The first benefit of billing TOU consumption by aggregating interval reads is the flexibility that affords. If the TOU rate structure is going to be modified in the future to account for changing system load patterns that warrant consideration of new peak times, meters do not have to be reprogrammed for the new hours. If a customer wants to shift from the EV Savers rate to the Smart Savers rate with different peak period definitions, meters do not have to be reprogrammed. The interval readings are always going to be available with AMI, so it only makes sense to leverage them to

bill more sophisticated rates. Beyond the flexibility of using interval readings, the meters' capabilities to take snapshot reads are still limited to a certain number of time periods. The complexity of the Smart Savers rate, which utilizes three distinct pricing periods with separately defined peak periods in the summer and non-summer seasons, exceeds the practical capabilities of the meters for defining TOU periods and recording their consumption. In order to utilize such a rate structure, it is simply necessary to bill based on an accumulation of interval reads. To that end, the starting and ending snapshot reads for the different categories of consumption that must be billed simply won't exist.

To the extent that the rule is interpreted to only require one snapshot read at the beginning and end of the billing period to be shown on the bill, despite the multiple billing periods a TOU rate may feature – and to the extent that the AMI meters will still capture such a beginning and ending snapshot read - it is still necessary to waive this rule provision. The reality is that the TOU bill, because of the requirement to apply different rates to usage from different periods, will be based on aggregations of interval usage within the various usage periods. Using a snapshot read to show the starting and ending of the billing period and inferring the usage as the difference between the two may not result in a total usage that matches the summation of the aggregated interval usage in each TOU period due to rounding or small differences between the interval and register usage arising from the different estimation routines used to fill in missing data (which are discussed further below⁵). Clearly it would create unnecessary customer confusion if they tried to look at their starting and ending reads, and the implied usage was different from the sum of the usage reported in each TOU period (due to rounding issues).

⁵ Larger differences between reading types will result in manual review to ensure consistency between the reading types.

To avoid customer confusion regarding implied usage versus beginning and ending reads, snapshot reads and interval usage would have to go through a reconciliation process prior to being used on customer bills. That said, the Meter Data Management System ("MDMS") that Ameren Missouri is using is an L+G product that does not contain the functionality needed to perform such a reconciliation between interval and register reads, and L+G has no current plans to implement such a reconciliation function. If Ameren Missouri requested L+G to develop such a reconciliation functionality, it would likely take a period of years to be fully rolled out to users such as the Company. As a result, this type of reconciliation functionality simply could not be rolled out in time for the Company's proposed implementation of TOU rates.

It is also not practical or desirable to perform such a reconciliation between interval and register reads after the verified, billing quality data leaves the MDMS and is processed in the CSS billing system. That is because the MDMS will be a system of record of final usage used to populate other Company applications, including the presentment of interval usage data to customers. Recall that the availability of this more granular and timely usage data to customers is a key benefit of AMI, as it can be used to help customers better manage their usage and optimize performance on TOU rates. But the MDMS system is also not designed with the interfaces necessary to receive information from the billing system (rather, it only provides billing quality usage to the billing system). As a result, to the extent that usage estimates were reconciled (i.e., subject to adjustment) outside of the MDMS (e.g., in the billing system), the data from the MDMS that is then communicated to customers or other internal Company systems potentially will not align with customers' bills. This, again, would simply cause customer confusion and frustration, as well as inconsistent data between Company data sources.

In summary, while the idea of a kWh or two of difference between interval-based usage and register read-based usage sounds like a minor issue, it is in fact a significant complication that cannot be practically remedied, particularly in a time horizon that would be required to support the Company's AMI rollout and TOU offering timelines.

New optional rate offerings for customers that give greater ability to manage energy bills in a manner that promotes more optimal use of the system and lower long run costs are a significant benefit of the deployment of AMI meters. This Commission has expressed interest in the availability of TOU rates in the past in a number of contexts. The benefits of such rates and the increased customer choices that they represent, and the flexibility of AMI meters to accurately bill them based on interval readings, will be enabled by a variance from the applicable rule.

Customer Meter Reading

The third variance requested relates to several provisions of Chapter 13 of the Commission's rules that relate to customer-supplied meter readings. 20 CSR 4240-13.020(2)(A)3, cited below, creates an option for the utility to provide means for the customer to provide a self-supplied meter read:

(2) Each billing statement rendered by a utility shall be computed on the actual usage during the billing period except as follows: (A) A utility may render a bill based on estimated usage— 3. When the utility is unable to obtain a meter reading for reasons beyond the utility's reasonable control, including an inability to access the customer's premises as necessary. If the utility is unable to obtain an actual correct meter reading for these reasons, where necessary it shall undertake reasonable alternatives to obtain a customer reading of the meter, for example mailing or leaving postpaid, preaddressed postcards upon which the customer may note the reading unless the customer requests otherwise

20 CSR 4240-13.020(3) goes a step further, in that it requires the utility to provide customer, in some circumstances, the option of reading their own meters and providing that meter reading to the utility:

(3) If a utility is unable to obtain an actual meter reading for three (3) consecutive billing periods, the utility shall advise the customer by first class mail or personal delivery that the bills being rendered are estimated, that estimation may not reflect the actual usage, and that the customer may read and report their electric, gas, sewer, or water usage to the utility on a regular basis. A utility shall explain to the customer the procedure by which this reading and reporting may be initiated. At least annually, a utility shall attempt to secure an actual meter reading from customers who are reporting their own usage, except for quarterly-billing utilities in which case it shall be every two (2) years. These attempts shall include personal contact with the customer to advise the customer of the regular meter reading day. The utility shall offer appointments for meter readings on Saturday or prior to 9:00 p.m. on weekdays. The utility's obligation to make appointments shall begin only after a tariff, describing the appointment process, has been filed with and approved by the commission. Discontinuance of the service of a customer who is reading and reporting usage on a regular basis because of inability to secure an actual meter reading shall not be required.

And 20 CSR 4240-13.040(3) goes on to describe the communication that utilities must provide related to the practice of customers reading their own meters:

(3) A utility shall prepare, in written form, information in plain language, which summarizes the rights and responsibilities of the utility and its customers in accordance with this chapter. The form shall be submitted to the consumer services department of the commission, and to the Office of the Public Counsel. This written information shall be displayed prominently, and shall be available at all utility office locations open to the general public, and shall be mailed or otherwise delivered to each of the utility's residential customers upon request. The information shall be delivered or mailed to each new customer of the utility upon the commencement of service and shall be available at all times upon request. The written information shall indicate conspicuously that it is being provided in accordance with the rules of the commission, and shall contain information concerning, but not limited to— (G) Explanation of meter reading procedures which would enable a customer to read his/her own meter.

In practice, these rule provisions require a process that is scarcely used even today, with the Company's existing AMR system. In fact, from January through September 2019, the Company has received a total of only 17 customer supplied meter readings across our service

territory. With greater reliability of the AMI network, the incidence of customer-supplied readings even being needed should be reduced significantly. To that end, the practice of the post card read is increasingly archaic and unnecessary. Beyond that point, though, the increasing number and sophistication of rate options (i.e., TOU) proposed by the Company make the prospect of customers supplying reads more complicated, and in some cases, impossible. In fact, because as previously discussed, TOU rates will be billed based on aggregated interval data rather than snapshot reads, there is no way for customers to self-supply a reading relevant to the billing of a TOU rate. At a minimum, a variance from these provisions is essential to the Company's ability to offer such TOU rates. But a broader variance from all customer-supplied reads simply makes sense, given the improved network reliability coupled with the existing infrequency with which the process is utilized today. Removing this practice will simply be more efficient and eliminate the potential for customer confusion, with no associated detriment.

The first cited provision (20 CSR 4240-13.020(2)(A)3) only gives customer-supplied meter reading as an example of methods the utility may employ to obtain meter information, and therefore, arguably, a variance is not required from this provision since it doesn't *require* customer readings to be utilized. However, the other two provisions specifically require the utility to allow self-supplied readings in certain circumstances, and to explain to customers how they can provide their own readings. Based on the enhanced functionality of the AMI network, missing readings should be much less of a problem going forward to begin with, obviating the need for customer readings in many cases where they may be utilized today. The fact that customers may not be able to ascertain accurate and relevant information from an AMI meter suggests that, even in the more limited circumstances where the utility cannot retrieve the reading through the network, a customer-supplied reading will simply not be a viable option. The

many benefits previously discussed in this report - in the form of lower cost and enhanced services that will be available as a result of AMI - however, means the *need* for estimation itself will be reduced from its already typically low levels.

In the event that the Company cannot remotely read the meter using the AMI network, a manual read request may be issued to dispatch a Company representative to manually retrieve the meter reading. The Company representative will attempt to read the customer's AMI meter wirelessly at first from their truck; if that process fails, the employee will physically read the AMI meter using a diagnostic probe to retrieve register and interval data. In general, the Company will attempt to manually read a meter after two successive months of estimated billing.

Estimation Routines

The Company expects that the AMI meters and associated network infrastructure will increase the overall granularity and quality of meter reading data acquired on a daily and monthly basis from each customer. Because of this increase in quality, the Company expects to observe, over time, a decrease in the volume of estimated bills sent to customers. However, when estimating is required to surmise usage within the customer's bill window, new estimation routines are available to increase the overall accuracy of those estimates by leveraging increased data quality and granularity from the AMI solution.

Today, the Company's billing system performs estimation for electric service based on two basic methods. The first method estimates the customer's usage for a given month based on usage incurred during the same month of the prior year. The second method estimates the customer's usage for a given month based on the customer's usage during the previous month of the same year. If the billing system, leveraging AMR data, does not have a meter reading at the

end of the billing period for the customer, usage for the entire billing period is estimated using these methods.

When the AMI system is deployed, as discussed earlier in this report, meter reads, including interval data, will be communicated by the meter to the Company every four hours. If a final meter reading is not available for any reason, but meter data has been collected for a portion of the month, the actual data will be used for the days it is available, and only the gaps in the data collected will be subject to estimation. This fact alone has the potential to significantly reduce the extent of estimated usage reflected on customer bills, even if there was no reduction in the number of bills that included any estimation.

The Commission rule pertinent to the procedures used to estimate bills is found in 20 CSR 4240-13.020(2)(C)1&2, which reads:

- (C) When a utility renders a bill based on estimated usage, it shall comply with the following:
1. A utility that has an estimating procedure in its filed and commission-approved tariffs shall follow that estimating procedure;
 2. A utility that does not have an approved estimating procedure shall base the estimate on that customer's historical average usage at the same premises for the same billing periods during any or all of the past three (3) years for which actual usage data is available. In the event the customer was provided utility service at the premises for less than one (1) year, then the estimate shall be based on usage from the average of the customer's actual usage for the previous three (3) billing periods. If the customer has not had utility service for three (3) billing periods or if actual usage during that time is not available, the utility shall base the estimate on the average usage of available actual usage data for the months the customer has had utility service. In cases where no prior actual usage information is available or the prior usage is estimated and cannot be determined by subsequent actual meter readings, the utility shall base the estimate upon average usage of similarly situated customers;

For purposes of estimation going forward under AMI, due to the increasing options and multiple estimation scenarios that may occur (e.g., partial month estimation, full month estimation, interval estimation, etc.), the Company is proposing tariff language to define the new estimation routines that it will follow. The estimation routines will generally rely on prior year

usage from the same billing period when that data is available. For this reason, the estimation routines will only begin to be utilized when sufficient historical AMI data is available to apply them (generally after one year of operation of each customer's new meter). A summary of the hierarchy of estimation routines for register is shown in Figure 7 below, and the routines for estimating interval reads are shown in Figure 8 below:

Figure 7: Register Read Estimation Routines

Scenario	Option	Description of Estimation Routine
Same customer with ADU⁶	1	Use the calculated average daily usage for the same customer and location, from the prior year's same billing period
	2	Use the calculated average daily usage for the same customer and location, from the prior month's billing period
	3	Use the calculated average daily usage for the same customer and location, from the current billing period
	4	Use the calculated average daily usage for the same customer and location, for the last two year's billing month period
Same customer		
	1	Use the week-old good read for the same customer, location, and day type (E01)
	2	Use the two-week-old good read for the same customer, location, and day type (E02)
	3	Use the three-week-old good read for the same customer, location, and day type(E03)
	4	Use the four-week-old good read for the same customer, location, and day type (E04)
	5	Use the eight-day-old good read for the same customer, and location and day type (E05)
Same location	1	Use the calculated average daily usage for the same location, from the prior year's same billing period
	2	Use the calculated average daily usage for the same location, from the prior month's billing period

⁶ ADU stands for Average Daily Usage

	3	Use the calculated average daily usage for the same location, from the current billing period
	4	Use the calculated average daily usage for the same location, for the last two year's billing month period
Similar Customer	1	Use the calculated average daily usage for similar customers, from the prior year's same billing period
	2	Use the calculated average daily usage for similar customers, from the prior month's billing period

Figure 8: Interval Read Estimation Routines

Option	Description of Estimation Routine
1	Estimate missing intervals using same day's historical data for the same customer and location
2	Estimate missing intervals using like day's historical data for the same customer and location
3	Estimate missing intervals using interval flat line estimation

The ability to leverage interval data and interim month readings and the increased granularity of data, generally, are expected to improve the quality of the estimates at the same time that the more robust AMI network reduces the incidence of estimation over time.

Ultimately, we expect both fewer and better estimates to result from deployment of AMI.

Because the new routines will leverage more data and generally are expected to improve the accuracy of the estimates, the Company requests that the Commission approve the language proposed in tariff Sheet Nos. 131-131.2.

Opt-Out Provisions Changes

In the Company's pending electric rate case (File No. ER-2019-0335), the Company proposed tariff language related to customers' ability to elect not to have an AMI meter installed. Specifically, language was added to clarify that refusal to grant access to the meter or threats to Company representatives onsite to install the meter would constitute an election of opt out and

be subject to opt out fees, in the same manner as would happen if the customer communicated its election through a more traditional channel. Since that tariff language was filed, the Company has been developing its AMI business practices, and some unique potential circumstances have been identified that warrant further clarification of that language. However, the tariff sheets with that language and the related charges are currently pending in the electric rate case, so it cannot be modified until that case is complete.⁷ As such, the additional changes are proposed herein, but can only be implemented upon completion of the electric rate case.

The specific provisions that the Company proposes in the exemplar tariff submitted along with this report and application clarify what opt out fees will apply in circumstances where an opt out customer has multiple meters associated with the same account. In those circumstances, the first meter would be subject to the full \$45 monthly fee, but all subsequent meters on that account would only be assessed a \$10 fee, because each meter would not require a separate trip to be read. The other change relates to opt-out elections that occur prior to the AMI meter being set (i.e., there is no additional visit to the premises to install a non-communicating meter, but rather the legacy meter simply remains in place). Under these circumstances, the one-time setup would not be assessed because there was no new meter set required, but the ongoing monthly \$45 fee would become applicable when the Company is no longer able to read the existing meter due to the shutdown of the legacy AMR system.

⁷ Sheet No. 63, which contains the reconnection fee of \$30 is also pending in the electric rate case, so the addition of a \$10 AMI reconnection fee will similarly need to wait for the conclusion of the rate case. Since no AMI meters will be set prior to the conclusion of the electric rate case and therefore there will be no AMI reconnections during that time, such a delay will not impact any customers.

Summary

AMI meters and networking represent a significant step forward in terms of functionality. The Company is embarking on a significant project to utilize this functionality to provide a broad array of customer benefits, from lower cost, to improved outage response, to more rate options to help customer manage their bills, and beyond. The SMP is a necessary step in replacing the end-of-life AMR metering network, and in delivering on the benefits just described. With this report, the Company has described a variety of variances from Commission rules as well as revisions to Company tariffs that support the SMP in a manner that will help maximize those benefits. The Company requests that the Commission approve the requested variances and tariff revisions in order to advance the SMP and leverage the capabilities of this newest generation of metering and networking technology.

**BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI**

In the Matter of Union Electric Company)
d/b/a Ameren Missouri's Request for a)
Waiver of Various Tariffs and Regulations to)
Enable the Deployment of Automated)
Metering Infrastructure Beginning in 2020.) File No. EE-2019-0382

AFFIDAVIT OF STEVEN M. WILLS

STATE OF MISSOURI)
)
CITY OF ST. LOUIS)

Steven M. Wills, being first duly sworn on his oath, states:

1. My name is Steven M. Wills. I work in the City of St. Louis, Missouri, and I am employed by Union Electric Company d/b/a Ameren Missouri ("Ameren Missouri") as Director of Rates and Analysis.

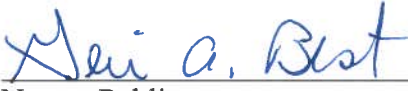
2. I have participated in the preparation of Ameren Missouri's *Smart Meter Program Report* ("*Report*"). In the above-captioned proceeding, I will be supporting the portions of the report related the rule variances and tariff revisions requested, and adopt the same as my testimony. I have knowledge of the *Report* in its entirety, and state that the *Report* is true and correct to the best of my knowledge and belief.



Steven M. Wills

Subscribed and sworn to before me this 7th day of October, 2019.

GERI A. BEST
Notary Public - Notary Seal
State of Missouri
Commissioned for St. Louis County
My Commission Expires: February 15, 2022
Commission Number: 14839811



Notary Public