Submission #4 for which payment has not yet been received:

Week Ending	Indemnity
7/7/21	$4,500,000
7/14/21	$4,500,000
7/21/21	$4,500,000
7/28/21	$4,500,000*
8/4/21	$4,500,000*
Total	$22,500,000*

*Estimated

The accidental outage insurance payments that have been received by Ameren Missouri up to this point have been recorded in FERC account 456.NEIL. This revenue has begun to be included in the current fuel adjustment rate (FAR) review that is currently ongoing before the Commission, ER-2022-0026 and this and any subsequent payments will continue to flow through the FAC until fully recovered by customers.

The primary property policy has a $10 million deductible. Ameren Missouri claimed an estimated $40 million on December 24, 2020 due to rotor and stator rewind expenses. EMANI covers 10% of the total property damage claim amount and follows NEIL's lead on the claim adjustment. For the property damage claim, Ameren incurred approximately $10.8 million in actual capital and expense costs, thus exceeding the $10 million deductible, in January 2021. Ameren Missouri recorded the actual deductible of $10 million on its books pro rata based on how the actual expense to FERC accounts 531, 932, 323, and 374 was recorded. Staff notes that two of these accounts are capital accounts and two of these accounts are expense accounts with FERC Account 932 being a labor loading account that in and of itself is not an above the line expense account this is recorded in the cost of service but rather is a clearing account to other expense accounts that are included in the cost of service. As mentioned above, Ameren Missouri has submitted invoices and paid expenses incurred (excluding accruals) to NEIL through 5/31/21. The estimated recovery is $40 million after the deductible. To date, no expenses have been submitted and formally denied or rejected from NEIL on the property damage claim. NEIL will not reimburse for overheads such as indirect overheads, AFUDC, or Purchasing,

Transportation and Storeroom loadings. As of June 30, 2021, Ameren Missouri has incurred loading costs of $5.3 million in capitalized labor and $13,903 of non-labor expense. Also, per the NEIL policy, the Root Cause Analysis expenses exceeding the cap of $150,000, are not eligible for reimbursement. Ameren Missouri has incurred approximately $738,305 of Root Cause Analysis costs that were expensed to FERC account 531 and 932. This leaves $588,305 of these costs ineligible for insurance reimbursement. The Company intends to seek reimbursement for all internal labor costs incurred, subject to the deductible and cap of root cause analysis in its property damage claim. In addition, $44.6 million of the total $48.5 million of the costs related to this unplanned outage is investment that if allowed to be recorded as such in this case will begin to incur return on the investment and return of the investment (depreciation expense) as soon as rates become effective for this rate proceeding. That would incur costs for rate payers in the current case that would not be relieved by reimbursement as that investment will continue to sit in rates until it is fully depreciated.

The correct method of recording should be similar to how Ameren Missouri already has recorded, and Staff recommended, for the reimbursements from the United States Department of Energy (DOE) for the capital costs Ameren Missouri was required to expend on dry cask storage for Callaway spent nuclear fuel. This method directly offsets the capital with the reimbursements and it does not incur future ongoing costs for Ameren Missouri's customers. According to Ameren Missouri, this outage is due to poor contract workmanship and Ameren Missouri's customers should not be harmed by this event. Customers will already begin to pay for the Refuel 24 costs (normalized over 18 months) as part of this rate proceeding. The very refuel for which the unplanned outage was caused, due to poor workmanship.

As of Ameren's 2nd quarter 2021 earnings presentation on August 6, 2021, the company does not expect this outage to have a significant impact on its financial results.

Staff is unaware if Ameren Missouri intends to pursue legal action or legal damages as remedies for the unplanned outage at Callaway regarding the contractor workmanship and any possible breach of contract.

Staff Accounting Recommendation

Ameren Missouri has received recovery of nuclear insurance premiums, labor and non-labor day to day operations and refuel costs for Callaway from customer rates. Customers

should not incur costs related to investment and expense that has not been fully offset with insurance proceeds for which they have funded in rates for this event. All capital associated with the outage should be considered contributions in aid of construction (CIAC) as Ameren Missouri is to receive property damage insurance proceeds that will reimburse the company for those costs. There are very minimal costs related to the Callaway unplanned outage recorded on Ameren Missouri's books and records during Staff's test year ending December 31, 2020 because of the date when Callaway went offline occurring December 24, 2020. That combined with the uncertainty surrounding the timing of determining and quantifying final capital and expense for the unplanned outage, the timing of full insurance reimbursement, any possible legal action or damages received due to the outage; Staff believes it is appropriate for Ameren Missouri to remove any capital and expense related to the event from its rate case and defer all capital costs, insurance deductibles, insurance reimbursements, (possible) legal fees, and (possible) legal damages until all of the items can be fully known and measureable and captured in customer rates in the next rate proceeding. At that time all ratemaking elements of the event can be reviewed and analyzed and netted to determine what costs remain that Ameren Missouri has not been reimbursed for through insurance. All costs can be reviewed for prudence and method of recording and a recovery period can be proposed for the unamortized balance by the parties, as this length of unplanned outage is highly unusual at Callaway. Staff has removed all non-labor expense related to the unplanned outage from the test year and has proposed an adjustment to remove all capital related costs through June 30, 2021 for its direct filing. As Callaway is now back to full generation, Staff has included Callaway at full generation in its modeling of fuel, purchased power and sales in this case. Staff will continue to review this issue during its true-up audit and may propose additional adjustments at that time.

Staff Expert/Witness: Lisa M. Ferguson

D. Ameren Missouri Research & Development (R&D)

As one of many R&D projects that Ameren Missouri has instituted, the company has recently executed a project in which it mines Bitcoin cryptocurrency using a converted shipping container with computers that is located on the distribution lines at the Sioux generation facility. Ameren Missouri only recently disclosed the full nature of this R&D project to Staff, and this R&D Project is at least potentially an issue in four current cases that Ameren Missouri has filed

before this Commission. In each of these cases, Ameren Missouri did not clearly state in testimony, or in some cases even discuss in testimony at all, what exactly the R&D project in question consisted of. In fact, in the cases that referenced the R&D Project in testimony, the testimony only vaguely stated that the project was to study improvements to system operations and reliability, with no discussion of the intention to mine Bitcoin. In addition, Ameren Missouri did not explain that this project impacts four different cases filed for requested authorization to include the associated costs and revenues in customer rates, nor did Ameren Missouri file its requests at one time in order to demonstrate the interrelated aspects of the cases. These cases are addressed by different departments of the Commission Staff and only after multiple meetings with Company did it become apparent what Ameren Missouri's filing requests actually entailed. The interrelated cases are Case Nos. ER-2021-0240 (general base rate proceeding), ER-2022-0026 (FAC rider recovery), EU-2022-0030 (AAO regulatory liability request), and potentially EM-2021-0309 (request for lease of fiber optic assets). A discussion of each case follows.

ER-2021-0240 – General Rate Proceeding

Ameren Missouri filed its request for a general increase of approximately $299 million in base rates on March 31, 2021. There was no discussion in the Company's filed direct testimony of the R&D project at Sioux regarding data centers installed to be used for mining of Bitcoin. After the meetings mentioned above, Staff discovered that Ameren Missouri included, as part of its estimated investment increase in its direct case, assets such as a modified shipping container and computers that are used for this Bitcoin mining project. The project began in April 2021. Ameren Missouri has incurred approximately $955,724 of capital costs, however a portion of that amount remains in overhead accounts that have not yet been recorded to individual plant accounts. As such, Staff has proposed an adjustment of approximately $616,000 in its direct case to remove these assets from the estimated plant additions that have been recorded to plant accounts. Staff will remove the remainder from plant in service during its true-up audit.

ER-2022-0226 & EU-2022-0030 – FAC Rider Review and AAO Regulatory Liability Requests

Ameren Missouri recently filed for recovery of its fuel adjustment rate (FAR) on July 30, 2021 in Case No. ER-2022-0226 and discussed in its testimony:

> There is one minor item, which increased ANEC $8,042 -during Accumulation Period 37. This small increase arose from electricity consumed for a research and development project being conducted near the Sioux Energy Center. The project is evaluating flexible data centers to determine whether, among other things, they can be operated as a dispatchable resource supporting the network's stability or delivering other benefits to the grid. These data centers may also provide new revenues (e.g., by producing digital assets) that if put into day-to-day operation in providing service could be used to contribute to affordability of service. However, they do consume electricity and therefore slightly increased the Company's load acquired from the MISO market (by 309,587 kWh). ...While the company believes this research project will ultimately prove beneficial to its operation of the system used to serve customers, the Company recognizes that no party has had the opportunity to address the topic and will therefore with the necessary Commission permission create a regulatory liability commencing on the date the FAR from this filing takes effect (October 1, 2021) and defer to that regulatory liability that part of the FAR billings arising from the $8,042 arising from the project, which will give the Commission the ability to consider in a future general rate proceeding whether or not that sum should be returned to customers.[70]

On August 6, 2021, in Case No. EU-2022-0030, Ameren Missouri requested that the Commission give its permission to defer to a regulatory liability the impact on ANEC arising from the R&D project commencing October 1, 2021, the day new FAR rates take effect which will have been impacted by electricity consumption from the R&D project, with such deferral authority to continue until further order of the Commission. Such authority will allow the Company to defer a total of $8,042 between October 1, 2021 and July 31, 2022, plus additional sums arising from this R&D project's impact on the Company's loads from and after June 1, 2020, as those impacts manifest themselves in ANEC for Accumulation Periods 38 and thereafter. Ameren Missouri's direct testimony in both of these cases was not clear on the precise nature of the project at Sioux, what digital assets the Company was referring to, nor any details on how this project would be beneficial to operations of the system. On August 11th, 2021, Staff and The Office of the Public Counsel's ("OPC") had a conference call with Company personnel to discuss these R&D costs. Staff was then informed the power used at Sioux plant for these R&D costs was used to mine Bitcoin. Staff requested and met with Company personnel in a

[70] Ameren Missouri, *Direct Testimony of J. Neil Graser*, ER-2022-0026, page 5, line 12 through page 6, line 11.

second meeting held on August 23rd, 2021 to seek further detail regarding the project. Staff has sent out several data requests seeking more information on these additional costs; however, there will be insufficient time for review and follow-up of these responses prior to the filing of this direct cost of service report.

EM-2021-0309 – Fiber Optic Lease Request

On June 11, 2021, in Case No. EM-2021-0309, Ameren Missouri requested authorization to enter into a contract with a third-party for utilization of fiber optic capacity not currently utilized for electric operations. Ameren Missouri owns and operates communications infrastructure used for its provision of electric service to its customers, including fiber optic cable that is part of the Optical Ground Wire Cable ("OPGW") that is installed throughout its electric transmission system. The fiber optic cable is used for a variety of growing communication needs, including operation of Ameren Missouri's SCADA system, for protection and control of its transmission lines, for other Company voice and communication needs, and more specifically in the case of the transmission system, for line differential relaying, high-speed stability protection, and to provide synchrophasor capabilities. A typical fiber optic cable included within OPGW installed today generally consists of 72 to 96 strands, not all of which are currently needed for electric service purposes but which, over time, are expected to be needed for electric service. The existence of fiber capacity not needed for electric operations today affords Ameren Missouri the opportunity to lease or otherwise contract with third parties (such as telecommunications providers) for their use of such excess capacity in exchange for fees for that use. Specifically, Ameren Missouri has entered into a Dark Fiber Lease Agreement (the "Lease") with internet services provider MCC Network Services, LLC ("Lessee"). Under the Lease, Lessee will lease 12 strands of "dark fiber" over an approximately 1.67-mile portion of Ameren Missouri's Sioux to Meppen 345 kilovolt transmission line where it crosses the Mississippi River between Missouri and Illinois. The Lease term is for 20 years, and can be extended by mutual agreement, and includes annual payments to lease the fiber. Upon 780 days' notice, Ameren Missouri may terminate the lease without any financial or other liability if during the term Ameren Missouri needs the leased fibers for its own purposes. As noted, the revenues received under the Lease can be used to offset Ameren Missouri's revenue requirement. Now that Staff has at least a better understanding of some of the aspects of the R&D project, Staff

now has concerns as to whether any portion of this fiber optic network will be utilized by Ameren Missouri to maintain its R&D project related to mining Bitcoin, due to the proximity of the portion of Ameren Missouri's Sioux to Meppen 345 kilovolt transmission line for which the lease relates. It is unclear at this time if this fiber optic line has any association with the R&D project at Sioux as none of the cryptocurrency aspects of the project were discussed in any testimony nor how any of these multiple cases are impacted because of the project. Discovery has been submitted in the fiber optic lease case on this topic. Staff's recommendation in Case No. EM-2021-0309 is now due on September 13, 2021.

In each of its cases Ameren Missouri's testimony was not at all clear on exactly what the project was that is occurring at Sioux. The language describes digital assets that would be beneficial to operations of the system and reliability. The project was portrayed as a venture supporting operations reliability and flexibility when in reality the project proposes to include computer hardware/software and associated facilities in customer rates to engage in a project that appears to be not at all necessary for safe and reliable service. In fact, the project is described as producing additional revenue that would drive down revenue requirement; however, there is no discussion regarding the conflict of interest in driving up load and reducing possible sales of energy (that offsets fuel and purchased power costs) that could occur if the project is included in rates. Ameren Missouri has no policies and procedures in place to protect customers for a project that is based on highly volatile market valuations. While Staff's investigation of the R&D Project is still at a preliminary stage, Staff currently has serious concerns regarding inclusion of the project costs in retail customer rates. Commission decisions on this issue in Case Nos. ER-2021-0240, ER-2021-0226 and EU-2022-0030 (and possibly EM-2021-0309) will determine whether any portion of the R&D Project costs will potentially be included in customer rates.

Staff Expert/Witness: Lisa M. Ferguson

E. Tracking Mechanism Proposals

In this rate proceeding, Ameren Missouri is requesting to establish two trackers; (1) a Meramec Energy Center Retirement Tracker and (2) a Two-Way Rate Switching Tracker. Staff supports Ameren Missouri's proposal for the Meramec Energy Center Retirement Tracker with a few suggested changes. However, Staff opposes Ameren Missouri's proposed Two-Way Rate Switching Tracker.

The term "tracker" refers to a rate mechanism under which the amount of a particular cost of service item actually incurred by a utility is "tracked" and compared to the amount of that item currently included in a utility's rate levels. Any over-recovery or under-recovery of the items in rates compared to actual expenditures made by the utility is then booked to a regulatory asset or regulatory liability account, and would be eligible to be included in the utility's rates set in its next general rate proceeding through an amortization.

The use of trackers should not be a common occurrence in Missouri rate regulation of utilities. Rates are normally set in Missouri to allow a utility an opportunity to recover its cost of service, measured as a whole, on an ongoing basis from the utility's customers. However, under this approach, with rare exceptions, neither utilities nor utility customers are allowed to be reimbursed through the rate case process for any prior under or over-recovery of costs experienced by the utility in rates, either measured for its cost of service as a whole or for individual cost of service components. For this reason, use of trackers in order to provide reimbursement in rates to utilities or customers of any over or under-recovery of individual rate component items is rare and should be dependent on unique and unusual circumstances.

The use of trackers may be justified under the following circumstances: (1) when the applicable costs demonstrate significant fluctuation and up-and-down volatility over time, and for which accurate estimation is difficult; (2) new costs for which there is little or no historical experience, and for which accurate estimation is accordingly difficult; and (3) costs imposed upon utilities by newly promulgated Commission rules. In addition, the costs should be material in nature.

Trackers are sometimes justified for significantly fluctuating and volatile costs because it allows for the reduction of risk associated with material inaccuracy in estimating the particular costs for the purposes of setting the utility's rates. All major utilities operating in Missouri, including Ameren Missouri, have tracker mechanisms in place for their pension and other post-employment benefit (OPEB) expenses. Annual pension and OPEB expense amounts have at times in the past had significant annual volatility, primarily because pension and OPEB funding amounts are impacted by investment outcomes in equity and debt markets, which, of course, can swing upward or downward based upon trends in the general economy. In addition, in Missouri, utilities place amounts intended for later payment to retired employees for pension

and OPEBs into external trust funds to help ensure that such funds are available when due to utility employees. Staff believes it is good policy for utilities to keep as current as possible on funding of pension and OPEB amounts because it encourages utilities to stay current on pension and OPEB expense allowances currently included in their rate levels. Of course, if pension and funding amounts turn out to be less than the amounts for these items currently included in a utility's rate level, use of trackers also ensure that the funding/rate differential would ultimately be flowed back to its customers.

Costs deferrals resulting from use of trackers are different from cost deferrals resulting from an accounting authority order (AAO). In Missouri, when someone refers to an AAO, it is understood that person is referring to a Commission order that allows a utility to defer certain costs on its balance sheet for potential recovery of the deferred costs in rates through amortization to expense in a general rate proceeding. This is similar to how deferrals resulting from trackers may be treated in general rate case proceedings. However, the nature of the costs to which AAOs are normally granted, and the nature of the costs to which tracking treatment is normally granted, are quite different.

Typically, AAOs have been used to allow utilities to capture certain unanticipated and "extraordinary" costs that are not include in their ongoing rate levels. The term ""extraordinary costs" are defined as costs associated with an event that is unusual, unique and non-recurring in nature. The classic example of an extraordinary even is the occurrence of a natural disaster, such as a wind or ice storm, or major flood that affects a utility's service territory.

In contrast, trackers have been used in Missouri to track certain costs that are ongoing to a utility and for which some allowance has been built into the company's existing rate levels. For this reason, while costs subject to trackers exhibit some highly usual or unique attributes which justify the use of a tracker, these costs are not "extraordinary" in the sense that this term is commonly applied to costs covered by AAOs.

Excessive use of trackers would tend to skew ratemaking results either in favor of the utility or in favor of its customers. Broad use of trackers would not provide the incentive a utility has to operate as efficiently and productively under the rate regulation approach in Missouri.

With certain exceptions, the policy in Missouri has been to set a utility's rates based upon measurement of "all relevant factors," taking into account levels of revenues, expenses, rate base and rate of return that are calculated at or approximately at the same point in time. Use of an "all relevant factors" approach is necessary to ensure that a utility's rate levels are based upon an accurate measurement of its cost of service at a particular point in time.

When using trackers as part of setting rates, certain cost factors inevitably receive different and inconsistent treatment compared to other cost factors. For example, if a utility tracks expenses that tend to increase in amount over time, but does not track cost of service factors that may reduce its cost of service (factors such as revenue growth, or increases in rate base offsets for accumulated depreciation or deferred taxes), the utility will have the potential of receiving retroactive dollar-for-dollar recovery of certain cost increases in its customer rates through the operation of its trackers while pocketing for itself any beneficial changes in other cost of service components that occur over the same period. In this manner, inappropriate use of trackers can lead to skewed and unfair ratemaking results.

An inevitable byproduct of the Missouri ratemaking approach is "regulatory lag." "Regulatory lag" is simply the passage of time between when a utility experiences a change in the cost of service, and the reflection of that change in its rate levels. While regulatory lag is often portrayed by utilities as a phenomenon that is entirely negative or harmful, the existence of regulatory lag does provide utilities with incentive to be as efficient and cost-effective over time as they can. Excessive use of trackers can serve to eliminate or weaken these beneficial incentives.

Regulatory lag can affect the earnings of a utility between general rate proceedings. The operation of regulatory lag as part of the normal ratemaking process exposes a utility to the prospect of lower earnings if its cost of service increases between general rate proceedings. However, it also allows the utility to experience higher earnings if the utility is able to reduce its cost of service that was established in the most current rate proceeding. This "penalty/reward" aspect of current Missouri ratemaking policy would be damaged by use of trackers if applied to normal cost of service items. A company that experiences an increase in an expense that is being tracked will experience no reduction in earnings related to that increase of costs (because the cost increase will be capture on its balance sheet and not on its income statement) and therefore, the

utility will have less incentive to attempt to minimize any such cost increase. On the other hand, a utility that experiences a reduction in an expense that is being tracked will experience no increase to its ongoing earnings level as a result of the decreased costs (again, because the cost decrease will be capture on its balance sheet and not on its income statement) and, therefore, would have less incentive to produce the lower cost levels in the first place.

1. Meramec Energy Center Retirement Tracker

Ameren Missouri plans to retire the Meramec Energy Center in December 2022, which is ten months after the operation of law date in the case (February 28, 2022). To include the full annual costs of the Meramec Energy Center into rates will create a situation in which Ameren Missouri may experience material over-earnings following the plant retirement. In recent history, Every Missouri[71] and The Empire District Electric Company[72] have both retired large generating facilities. In both instances, the full annual amount of costs for each generating facility were included in rates resulting from the most recent general rate case but with an AAO also established to defer the financial impact of costs and revenues no longer incurred by the utility following the retirement of the plant.

Ameren Missouri's proposal, while somewhat different from the other two scenarios listed above, also provides another means of ensuring that Ameren Missouri's customers receive the benefit of any cost savings over time from the retirement of the Meramec Energy Center, while Ameren Missouri is made "whole" for operating the plant between the effective date of rates in this case and the date of the Meramec Energy Center retirement. Staff witness Lisa M. Ferguson further discusses the mechanics of this tracker and Staff's proposed changes to Ameren Missouri's tracker request.

a. Development of Tracking Mechanism Base

The Meramec fossil fuel generating facility is planning to be retired by December 31, 2022 based on Ameren Missouri's current Integrated Resource Plan (IRP) filings. In this case, Ameren Missouri has proposed to include one fifth (1/5) of the costs listed below associated

[71] Case No. EC-2019-0200.
[72] Case No. ER-2019-0374.

with the Meramec facility in the cost of service and defer the remaining four fifths (4/5) in a tracking mechanism:

- Rate of Return including income taxes on the following items:
  - Plant-In-Service and Accumulated Depreciation Reserve at September 30, 2021
  - Coal Inventory – 13 month average ending June 30, 2021
  - Materials & Supplies – 13 month average ending June 30, 2021
  - Accumulated Deferred Income Taxes
- Depreciation Expense at September 30, 2021
- Power Plant Maintenance Expense at December 31, 2020

This base cost amount included in rates resulting from this case will then be used to compare to the actual costs incurred by Ameren Missouri to operate the Meramec facility from the effective date of rates until its retirement. In Ameren Missouri's next electric rate proceeding, the difference between the costs included for the Meramec facility in this case and one fifth (1/5) of the actual costs incurred to operate the plant until its retirement would be amortized in rates over a 5 year period. Ameren Missouri is also seeking carrying costs to be included in the deferred balances in its next rate case. Any items that normally have rate base treatment has been requested to be included in rate base at the weighted average cost of capital that will be determined as part of this current rate case. Any expense amount in the deferral mechanism would accrue carrying costs at Ameren Missouri's short term debt rate. As part of its direct testimony, the Company has not proposed to defer costs in the tracking mechanism past the retirement of Meramec (i.e. for any costs incurred subsequent to the retirement) nor have they proposed to include any cost savings that may occur during the time period Company has proposed.

Staff has reviewed the calculations regarding company's proposal. Staff agrees with the items Ameren Missouri has proposed to be included in base rates and the tracking mechanism; however, not necessarily the amount of each item. Ameren Missouri's proposed depreciation expense and rate of return are premised on the weighted average cost of capital and depreciation rates that they have proposed in their direct testimony in this case. Staff has differing positions regarding the depreciation rates, the return on equity, and capital structure for

electric operations. Staff agrees to use test year maintenance costs as a base amount for that item and Staff is using a thirteen month average regarding materials & supplies and coal inventory for purposes of the tracker.

There are a couple of items that Ameren Missouri did not propose to be included in the tracking mechanism that Staff believes would be appropriate to track as the costs are related to the Meramec facility, insurance expense and property tax expense. These costs cannot be delineated down to the dollar in regard to the amount specifically for Meramec. This is because insurance is procured on all of Ameren Missouri's assets, not each single asset and property taxes are assessed on a distributable property basis, not by asset. However, there are reasonable allocation methods that Staff has utilized based on company's responses to Staff data requests that have been used to determine the amounts that Staff has included in base rates and the tracking mechanism for property taxes and insurance. The one fifth portion of all expenses are either included in the individual line items or through the cash vouchers line item in Staff's cash working capital (CWC) schedule.

At the time of Staff's direct testimony, the plant and accumulated reserve and any associated return and depreciation expense are estimated until actual amounts are known at September 30, 2021. In addition, ADIT will not be known until September 30, 2021. Staff does not intend on adopting estimates for the ongoing operation of the tracker but rather will finalize the amounts for both the portion of Meramec's costs within the cost of service and the tracking mechanism during its true-up audit. Staff accepts company's proposal regarding carrying costs for the rate base and non-rate base items.

Please see Staff witness Kimberly K. Bolin's testimony section for a general policy discussion regarding Staff's position. In addition, 1/5th of Meramec property tax has been included in Staff witness Jason Kunst's annualization. There is also 1/5th of insurance expense related to Meramec included in Staff witness Christopher D. Caldwell's insurance expense annualization.

Staff Expert/Witness: Lisa M. Ferguson

2. <u>Rate Switching Tracker</u>

Ameren Missouri proposes to establish a two-way tracker to track changes in revenue that are directly attributable to residential customers optimizing their rate as new rates are

adopted. Staff is opposed to this tracker. Ameren Missouri is barred from requesting a Revenue Stabilization Mechanism (RSM) under Section 386.266.3., RSMo. because it has provided the Commission notice under subsection 5 of Section 393.1400., RSMo that it has elected the plant in service accounting treatment provided for in that section. [73] This tracker would track "lost revenues" which would essentially act as RSM. Also in contrast to "out-of-pocket expenditures costs incurred by the utility there is no "out-of-pocket" expenditure associated with lost revenues that would need to be tracked. It is merely a reduction in the earnings level of the affect utility. Staff will further address Ameren Missouri's tracker proposal in Rebuttal testimony.

Staff Expert/Witness: Kimberly K. Bolin

F. Automated Meter Infrastructure (AMI)

** [redacted] [74] [redacted] **[75] Ameren will also ** [redacted]

[73] See Sections 386.266.3. and 393.1400.5, RSMo.
[74] Ameren Missouri response to Staff DR No. 0319, attachment titled Smart Meter Program Report.
[75] Ibid.

[redacted] **[76]

Ameren Missouri has identified several benefits of AMI meter deployment most notably including: ** [redacted] **[77]

Staff Expert/Witness: J Luebbert

G. Cash Working Capital (CWC)

Cash working capital (CWC) represents the amount of cash required for day-to-day expenses incurred in providing service to ratepayers. In some instances, payments for goods and services are paid shortly after, or even before, the goods are utilized or the services are performed. In other instances, the payment for the good or service may occur long after the good or service is received. If, on average, the payment for goods or services utilized in the provision of utility service is made before the receipt of related customer revenues, the utility will have a relatively constant investment in cash working capital (i.e., an investment in the prepayment of cash expenses made in advance of the receipt of related service revenue.) In this instance, the utility's shareholders are compensated for the funds they provide in advance by inclusion of these funds in rate base. In that way, the shareholders earn a return on the funds they have invested. Conversely, if, on average, the payment for goods or services utilized in the provision of utility service is made after receipt of related customer revenues, the utility will enjoy a relatively constant source of cost-free funds supplied by ratepayers (i.e., ratepayers provide cost free capital to the utility in the form of payment for utility service prior to the time that the utility is required to pay "cash" for the goods and services consumed in providing the utility service). Ratepayers under this circumstance are compensated for the funds they provide by reducing rate base consistent with the amount of the customer-provided cash working capital.

[76] Ameren Missouri response to Staff DR No. 0319.
[77] Ameren Missouri response to Staff DR No. 0319, attachment titled Smart Meter Program Report.

To determine the amount of cash working capital provided by both the ratepayers and shareholders, Staff performs a lead/lag study. The lead/lag study involves analysis of the timing of when expenses are paid to suppliers, employees, etc., and when the utility receives revenues from customers for the services it provides. A positive cash working capital requirement indicates that the shareholders provided the working capital for the test year. This means, on average, the utility paid the expenses incurred to provide the electric service to the ratepayers before the ratepayers paid for the service. A negative cash working capital requirement indicates that the ratepayers provided the working capital during the test year. This means, on average, the ratepayers paid for their electric service before the utility paid the expenses incurred to provide that service.

In this case, Staff did not perform a full lead/lag study as Ameren Missouri has recently been before the Commission for a rate review. However, Ameren Missouri did prepare a lead/lag study specific to costs incurred during the 12 month period ending December 31, 2020. Staff has reviewed both the revenue and expense lags calculated by Ameren Missouri for accuracy and reasonableness. While Staff has adopted many of the revenue and expense lags proposed by Ameren Missouri, Staff determined that an analysis was needed with respect to the revenue lag and expense lags associated with sales tax and the expense lags for fuel, payroll, and payroll taxes. These differences are discussed in more detail below.

Staff has proposed a different revenue lag than Ameren Missouri. Staff agrees with the Company's calculations, the difference in lag amounts is due to Staff's use of updated information. Ameren Missouri's calculation of collection lag is based on data covering the 12 months beginning September 2019 through August 2020. Staff's adjustment is based on bill payment data for the 12 month period beginning January 2020 and ending December 2020.

Sales tax is collected by Ameren Missouri from its ratepayers and then remitted to the taxing authorities based on the arrangement established with the taxing authorities. Since the Company collects the tax for the taxing authority and a service is not provided to the ratepayer by the Company, measurement of the revenue and expense lag calculations start with the beginning point of the collection lag for sales tax. The collection lag is the period of time between the day the bill is placed in the mail by the Company and the day the Company receives Payment from the ratepayers for services provided. As a result the sales tax has a shortened

revenue and expense lag. Staff recommends a shortened revenue and expense lag for sales tax in this case.

** [redacted] **

The negative lead time associated with the pay date change reduces the expense lead for payroll and payroll taxes, and increases the positive net lag associated with these expenses which results in an increase to CWC and its associated rate base value. In calculating the expense lead for payroll and payroll taxes, Staff has set the lead time for the management payroll to zero for an overall expense lag of 12.01 to reflect the management payroll as it was prior to the change in November 2018.

Ameren Missouri has proposed different expense lags for electric operations and gas operations for payroll and withholdings, employee benefits, pensions and OPEBS, incentive compensation, and gross receipts taxes. Ameren Missouri incurs costs for both its electric and gas employees for payroll, incentive compensation and all employee benefits at the same time as the dates these payments are made are the same for both of company's operations and the dollar

amounts expended are all at once, not separately calculated and then separately expended for gas and electric operations. The same is true for gross receipts taxes. Whether the company is receiving payment for an electric or gas bill, the same percentage of tax is being applied to the revenue and that revenue must be paid to the taxing authority at the same time. Staff had expected that these lags would be the same. The Company's response to Staff DR No. 0515 in case No. ER-2021-0241, explains "for example, there are two components of the incentive compensation expense lag. The Executive Incentive Compensation Plan is paid in February, while all other payments occur in March. Even though these payments occur on the same dates for gas and electric the relative amounts paid on these dates are different between gas and electric. It is the difference in these relative amounts that results in the expense lag for Incentive Compensation in total to be different between gas and electric." The difference in these lags is due to Ameren Missouri's use of a weighted average of the applicable components of each lag, in this case the component that is causing the difference between gas and electric operations is the specific dollar amounts. Rather than taking all of payroll and performing the calculation, the gas amounts are first allocated and then the separate lags are calculated. Staff has set these lags to be the same to reflect the reality of the transaction, which is that all of the items above are paid at one time.

All of Staff's recommended revenue and expense leads can be found in Accounting Schedule (8). Staff's overall lead/lag study resulted in a negative CWC requirement for Ameren Missouri. This means that the ratepayers are currently providing the working capital, in the aggregate, to Ameren Missouri. Therefore, the ratepayers will be compensated for the working capital through a reduction in rate base.

Staff Expert/Witness: Jane C. Dhority

H. Plant-In-Service Accounting ("PISA") Regulatory Asset Balance

Staff has included adjusted PISA deferrals through June 30, 2021 with an estimate through September 30, 2021 as an addition to rate base. As part of Staff's true-up audit, Staff will examine actual deferred amounts through the September 30, 2021 cutoff. For a complete discussion on PISA, please refer to the Plant-In-Service-Accounting Amortization section of this revenue requirement cost of service report.

Staff Expert/Witness: Jason Kunst, CPA

I. Pays Regulatory Asset

As part of the Commission approved stipulation and agreement in Case No. EO-2018-0211 the parties agreed to allow Ameren Missouri to operate a Pay As You Save (PAYS) program as part of the MEEIA 3 offerings. The program allows Ameren Missouri to offer financing to eligible customers for energy efficiency upgrades. Participants are charged a 4% financing fee on their bill, while non-participants are charged the difference between pre-tax Plant-In-Service Accounting rate and the 4% financing cost until the regulatory asset is moved into base rates. The parties agreed that Ameren Missouri would offer $5 million in financing to eligible customers beginning in 2021, and would offer $10 million in 2022. The stipulation and agreement also called for the PAYS regulatory asset to be included in rate base and given typical cost of capital treatment in future rate cases with offsetting revenues being calculated from participants bills. Staff has included the regulatory asset balance of ** [redacted] ** as of June 30, 2020 in the cost of service calculation. The PAYS program is currently ** [redacted] ** spend for calendar year 2021 as agreed to in the Stipulation and Agreement in EO-2018-0211. Staff will continue to review the regulatory asset balance through the September 30, 2021 true-up cut-off date.

Staff Expert/Witness: Jason Kunst, CPA

J. Prepayments and Materials and Supplies

Ameren Missouri utilizes shareholder funds for prepaid items such as insurance, rents, employee benefits, and maintenance agreements. These items are included in rate base, so that the up-front investment made by Ameren Missouri related to prepayments is recognized in customer rates. Staff has included a 13-month average level ending June 30, 2021, of prepayments in rate base. Staff will review prepayments during its true-up audit.

Ameren Missouri maintains a variety of materials and supplies in its inventory in order to meet the day-to-day needs of its utility operations. Due to the impending retirement of the Meramec generating facility at the end of 2022 and the establishment of a tracking mechanism in this proceeding, Staff determined it appropriate to include one fifth (1/5) of Meramec's materials and supplies in the cost of service and include four fifths (4/5) of the materials and supplies in the tracking mechanism. For the remainder of the materials and supplies, Staff included a

13 months ending June 30, 2021, in rate base. Staff will reexamine the level of both materials and supplies as part of its true-up audit.

Staff Expert/Witness: Christopher D. Caldwell

K. Customer Deposits

Customer deposits are funds received from Ameren Missouri's customers as a security against potential loss arising from failure to pay for utility service received. Until the deposit is refunded, customer deposits represent a source of funds available to the Company and are included as an offset of rate base investment. Staff included a 13-month average from June 2020 through June 2021 of customer deposits in the cost of service. Staff will re-examine the amount of customer deposits to include in rate base as part of its true-up audit.

Staff Expert/Witness: Christopher D. Caldwell

L. Customer Advances

Customer advances are funds that individual Ameren Missouri customers provide to the Company to assist in the costs of the provision of electric service to them. Unlike customer deposits, customer advances are never refunded and no interest is paid to the customers for the use of their money, these funds represent an interest-free source of capital to the Company. Therefore, it is appropriate to include these funds as an offset to rate base. Staff included a 13-month average from June 2020 through June 2021 of customer advances in the cost of service. The level of customer advances will be re-examined as part of Staff's true-up cut-off, September 30, 2021.

Staff Expert/Witness: Christopher D. Caldwell

M. Renewable Energy Credits (RECs) and Emission Allowances

Ameren Missouri maintains a balance of RECs and Solar RECs (SRECs) which primarily represent the energy generated from renewable energy sources that they receive through their contract with the Pioneer Prairie wind and solar generation respectively. Ameren Missouri also maintains a small balance of emission allowances that are distributed to utilities (and other industries) as part of a cap and trade system which is designed to limit pollution emissions. The cap on greenhouse gas emissions is a firm limit on pollution and becomes stricter over time.

The trade part is a market for companies to buy and sell allowances that let them emit only a certain amount of pollution, as supply and demand set the price. An emission allowance authorizes a utility to emit one ton of emissions during a given compliance period. Allowances are a fully marketable commodity. Once allocated to the utility, allowances may be bought, sold, swapped or banked for use in the future. Trading of emission allowances gives utilities an incentive to save money by cutting emissions in a cost effective manner. The Environmental Protection Agency administers this cap and trade system as part of its Acid Rain Program that was established under the 1990 Clean Air Act Amendment.

Staff noted a significant decline in the balance of RECs and SRECs from December 2017 through August 2018 but the balances stabilized with some monthly variation subsequent to September 2018. Ameren Missouri's emission allowance balances levels have also exhibited some variation as well. However when Staff reviewed the data through June 2021, the balance of RECs and emission allowances reached a net zero. According to company's response to Staff DR No. 0444, Ameren Missouri expects account balances to decrease over time if Renewable Energy Standard (RES) compliance can be met through self-generated RECs and if compliance with emission regulation can be met through allocated allowances. Staff discussed this company personnel and there may be further RECs and emissions allowances purchased but any amount is unknown at this time. Therefore, Staff has included in rate base zero emission allowances, RECs and SRECs that existed as of June 30, 2021. Staff will continue to examine these balances through the September 30, 2021 true-up cutoff established by the Commission in this rate case and may recommend further adjustments for this issue based on activity through that time period.
Staff Expert/Witness: Lisa M. Ferguson

N. Fuel Inventories

1. Fuel Inventory – Coal On-Site and Coal-In Transit

Ameren maintains fuel inventories of nuclear fuel, natural gas, oil and coal for its production facilities. For the coal inventory at Ameren Missouri's coal-fired power plants (Labadie, Rush Island, Sioux Energy Center, and Meramec Energy Center), Staff calculated thirteen-month averages ending June 30, 2021 of the actual coal inventory levels and coal in transit during that period. For all coal plants, Staff has included coal-in-transit balances in the

coal inventory. Coal-in-transit is coal that is in-route to Ameren Missouri facilities, either by truck, train or, barge, but has not yet arrived at the plant. Staff then multiplied the normalized quantity of coal by the current coal prices to calculate the rate base value for coal inventory. Staff's normalized coal inventory does not include an amount of inventory for what was formally referred to as the Hillcrest Pile, as Ameren Missouri has ceased maintaining the coal pile due to Meramec's pending retirement. Staff has included 1/5th of the normalized coal inventory for Meramec in Staff's cost of service and have then included 4/5th of the remaining Meramec coal inventory in the tracker mechanism.

2. Fuel Inventory – Non Coal

Ameren maintains fuel inventories of nuclear fuel, natural gas, and oil for its non-coal production facilities. The average inventory levels, calculated as described below, are for periods ended June 30, 2021:

Fuel	Calculation
Nuclear	18-month average of unspent fuel in the fuel core and fuel held on-site.
Gas	13-month average of the quantity held multiplied by the current cost of inventory.
Oil	13-month average of inventory balances.
Coal	13-month average of inventory balances.

Staff will update its fuel inventories for the September 30, 2021 true-up period.

Staff Expert/Witness: Lisa M. Ferguson

O. Pensions and Other Post Employment Benefit - Rate Base

See the discussion in Income Statement, Payroll and Benefits section of this report.

Staff Expert/Witness: Paul K. Amenthor

P. Accumulated Deferred Income Taxes ("ADIT")

Ameren Missouri's Accumulated Deferred Income Tax Reserve ("ADIT") represents, in effect, a prepayment of income taxes by Ameren Missouri's customers to Ameren Missouri prior

to payment being made by Ameren Missouri to taxing authorities. As an example, because Ameren Missouri is allowed to deduct depreciation expense on an accelerated basis for income tax purposes, the depreciation expense deduction used for income taxes paid by Ameren Missouri is considerably higher than depreciation expense used for ratemaking purposes. This results in what is referred to as a "book-tax timing difference" and creates a deferral of income taxes to the future. The net credit balance in the deferred tax reserve represents a source of cost-free funds to Ameren Missouri. Therefore, Ameren Missouri's rate base is reduced by the deferred tax reserve balance to avoid having customers pay a return on funds that are provided cost-free to Ameren Missouri. Staff has included the ADIT balance as of June 2021 in its direct cost of service. As part of its true-up audit, Staff will re-examine the ADIT balances to make sure all items included in those balances are consistent with the other components of the cost of service and that they reflect the current balances at the true-up cut-off date, September 30, 2021. Based on this true-up examination, Staff may make additional adjustments to the cost of service as necessary.

Staff Expert/Witness: Lisa M. Ferguson

VIII. Solar Programs

A. Community Solar

Community Solar is a voluntary program that Ameren Missouri first proposed as a pilot program in Case No. EA-2016-0207. This program has a separate and distinct tariff and rate from the rest of Ameren Missouri's tariff and rates. Ameren Missouri has proposed several changes to the Community Solar Tariff in the context of this rate case. For detail regarding Staff's position on Ameren Missouri's proposed changes to the Community Solar program, please see Staff witness Amanda Coffer's testimony that will be included in Staff's Direct Class Cost of Service report.

The program is designed for electric customers that want to take part in utilizing solar generation for the electricity they use but are unable to install solar panels. Those customers in the residential (1M) and Small General Service (2M) customer classes who have not received a disconnection notice in the last 12 months, have not requested an optional time of use rate, or participate in net metering are eligible for the program. Customers' sign up, on a first come, first serve basis, to subscribe to 100 kWh blocks of a single generation asset in which that asset's total

generation is shared by all subscribers to the program. These blocks of energy replace an equivalent kWh amount of electricity customers receive from their standard class of service. The first asset to be built and utilized for this purpose was the solar array built at Lambert International Airport in St. Louis, MO. This facility was interconnected and operational in August 2019 but did not complete testing for in-service until December 2019. The Lambert solar facility is 942 kW-AC and as of July 1st, 2021 is fully subscribed. Customers who have not been able to join the program due to limited availability are on a waiting list and when blocks for a solar asset open up, those customers can then subscribe to the program by paying a generation fee.

Ameren Missouri recently expanded its Community Solar program in Case No. EA-2020-0371. Ameren Missouri sought and was given permission by the Commission to build a second solar facility in Montgomery County, MO. Ameren Missouri broke ground on this 6.16 MW-AC facility in June 2021 and it is expected to be complete in December 2021.

The investment, revenue and expense for the Lambert facility is fully included in rates at this time. Ameren Missouri records 85% of any return and depreciation related to the facility in its PISA deferral until the actual plant is in service and included in base rates. There is no RESRAM treatment related to Community Solar.

However, it has been Staff's position that because this program is voluntary, and it is included in the cost of service, if at any time during the life of the Community Solar program, the program revenues do not fully offset the investment and expense related to the program, then Staff will propose an adjustment to remove the excess cost that occurs above the revenue during a base rate case. If this adjustment is not proposed, non-participant customers would be subsidizing the program for which they do not participate. This would drive the cost of service away from actual cost based rates. As such, Staff recommends that Ameren Missouri record all elements of its investment, revenue and expense related to the Community Solar Program with distinct coding in its general ledger so as to clearly delineate this program from the rest of the cost of service. Any items that cannot be clearly defined, such as tax related items, insurance or property tax, should be reasonably allocated with all supporting documentation for that allocation available to Staff during a rate case proceeding. Company has committed to this for

its Montgomery County facility and should commit to providing this information going forward for future program costs and revenues.

At this time, Staff is not proposing to adjust any of the cost of service aspects of the Lambert facility as it is fully subscribed; however please see Staff witness Kunst' testimony regarding the removal of the 85% of depreciation and return and carrying costs associated with the Lambert facility from the date it went into service until the facility was included in base rates on April 1, 2020. Ameren Missouri has a separate and distinct tariff that addresses the Community Solar Program and that rate is designed to cover all costs of the program, Staff considers inclusion of this amount as double recovery because Ameren Missouri began to receive for this program as soon as it went into service. There was no delay between when the facility began to operate and tariff rate recovery as opposed to the rest of base rates changing on April 1, 2020 for the remaining investment. Staff will review the levels of program participation as part of its true-up audit at September 30, 2021 and may propose further adjustment at that time.

B. Neighborhood Solar

In this program, Ameren Missouri is investing in solar facilities similar in nature to that of the O'Fallon solar facility but at a much smaller scale. Ameren Missouri will finance, build, and operate solar canopies in parking areas at partner sites and in return the partner provides the land for the solar facility for up to 38 years. An Exclusive Solar Energy Project License and Easement Agreement will be executed between Ameren Missouri and each partner facility. This is not a voluntary program like Community Solar and does not have a separate and distinct tariff. The investment, revenue, and expense related to these facilities will be included in the overall cost of service and resulting overall customer tariffed rates once the facilities go into service.

Workforce development and educational opportunities are expected to be generated through the construction of these facilities. These facilities are not necessary to meet Missouri's Renewable Energy Statute (RES) at this time but these facilities will produce solar rebates.

As part of Senate Bill 564, effective as law on June 1, 2018, Section 393.1665(2)(3) requires:

> An electrical corporation with one million or more Missouri electric customers shall invest in the aggregate no less than fourteen million dollars in utility-owned solar facilities

> located in Missouri or in an adjacent state during the period between the effective date of this section and December 31, 2023. If the rate impact of the electrical corporation's investment in such facilities would cause the electrical corporation to exceed the one percent maximum average retail rate increase limitation required by subdivision (1) of subsection 2 of section 23 393.1030, that part of such costs that would cause such one percent limitation to be exceeded shall be deferred by the electrical corporation to a regulatory asset. Carrying costs at the electrical corporation's weighted average cost of capital shall be added to the regulatory asset balance and the regulatory asset shall be recovered through rates set under section 393.150 or through a rate adjustment mechanism under section 393.1030, as soon as is practical.
>
> An electrical corporation's decision to invest in utility-owned solar facilities consistent with subsection 2 of this section shall be deemed to be prudent. An electrical corporation shall not be required to obtain the permission of the commission to construct the facilities required by this section, notwithstanding the provisions of section 393.170. The commission shall retain the authority to review the specific costs incurred to construct and own the facilities to ensure that rates are based only on prudently incurred costs.

As subsections 2 and 3 of Section 393.1665 states above, Ameren Missouri is allowed by this law to build these specific type of facilities without the requirement to seek a certificate of convenience and necessity (CCN). Staff is allowed to review the costs associated with these facilities prior to these costs going into base rates. Ameren Missouri plans to include 85% of the program return and depreciation on the investments in the Plant in Service Accounting (PISA) deferral balance once the facilities go into service. Ameren Missouri is not seeking RESRAM treatment for the capital or expense for this program as they do not consider these projects necessary to meet RES compliance.

At this time, Ameren Missouri has notified Staff of two projects as part of the program that will be used for generation of energy into the grid. The first facility is located at Habitat for Humanity in south St. Louis (South St. Louis Renewable Energy Center). The site was selected in January 2020, is a 192 KW-AC facility and its expected output is 308.4 MWh/year. The site preparations and construction began for this facility in December 2020 and is expected to be in-service in August 2021 with substantial completion by August 1, 2021.

The second facility is located at Southeast Missouri State University in Cape Girardeau. The site was selected in January 2020, is a 1.2 MW-AC facility and its expected output is 1,792 MWh/year. The site preparation and construction for this facility is expected to begin in August 2021 and is anticipated to go into service in early 2022 with substantial completion by May 12, 2022.

At the time of Staff's direct testimony, neither facility has gone into service nor has been assessed for in-service criteria. Staff will review the costs for the first facility as part of its true-up audit and will include the investment, revenue, and expense in the cost of service once it has met in-service criteria. As far as Staff is aware, inclusion of the Habitat for Humanity facility will not exceed the one percent rate limitation set by Senate Bill 564. A fully executed contract between Ameren Missouri and the partner facilities will need to be provided to Staff prior to each facility being included in base rates. The one percent limitation as well as all project related contracts will also be reviewed during Staff's true-up audit.

Staff Expert/Witness: Lisa M. Ferguson

IX. In-Service Criteria Overview

A. Wind Facility Construction Audits

In order to meet the Missouri Renewable Energy Standards, Ameren Missouri applied for and was granted two Certificates of Convenience and Necessity to construct and own two wind generation facilities High Prairie[78] and Atchison[79]. As part of the stipulation and agreements reached in the respective cases, the parties agreed to not challenge the prudence of the decision to construct the facilities or purchase the facilities under the terms of the BTA[80, 81].

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[78] Order Approving Third Stipulation and Agreement effective November 3, 2018 in EA-2018-0202. "Union Electric Company d/b/a Ameren Missouri is granted a certificate of convenience and necessity to construct and own a wind generation facility to be constructed in Schuyler and Adair Counties in Missouri under the Build Transfer Agreement with TG High Prairie Holdings, LLC, as described in its application, subject to the conditions set forth in the Third Stipulation and Agreement."

[79] Order Approving Stipulation and Agreement effective August 25, 2019 in EA-2019-0181. "Union Electric Company d/b/a Ameren Missouri is granted a certificate of convenience and necessity to construct and own a wind generation facility, which includes gen-tie facilities, to be constructed in Atchison County, Missouri under the Build Transfer Agreement with Enel Kansas, LLC, as described in its application, subject to the conditions set forth in the Stipulation and Agreement."

[80] Prudence: The Signatories agree that they shall not challenge the prudence of the decision to acquire the facility under the terms of the BTA, including Non-Compliant wind turbine generators under the terms of the BTA, and to merge TG High Prairie, LLC into Ameren Missouri if the acquisition of the facility closes pursuant to the BTA. Nothing in this Stipulation limits the ability of any Signatory or other party from challenging the prudency of the

At the time of Staff's direct filing in this case, Staff is including the estimated true-up value of the High Prairie and Atchison Renewable Energy Centers with the exception of ** [redacted] ** in the revenue requirement. ** [redacted] ** While Staff has included the estimated costs of ** [redacted] ** in the cost of service report, as part of its direct filing, Staff will continue to review the actual costs through the September 30, 2021 true-up cut-off date established in this case.

Appendix 5 – provides a more detailed description regarding the Construction Audits for the High Prairie and Atchison Renewable Energy Centers.

Staff Experts/Witnesses:
Jason Kunst, CPA; Claire M. Eubanks, PE; J Luebbert, and Shawn E. Lange, PE

1. Atchison Facility Asset Removal

As further described below in the Renewable Energy Standard Rate Adjustment Mechanism and in Appendix 5, Staff is removing ** [redacted] ** from plant and ** [redacted] ** from accumulated reserve to account for ** [redacted] ** that is unlikely to be in service by the true-up cut-off date established by the Commission in this case.

Staff Expert/Witness: Jason Kunst, CPA

In order for Staff to recommend inclusion of generating units, including solar or wind facilities in rate base, the plant must be "fully operational and used for service." A new facility usually will not have any historical operating information from which Staff can make a

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design, construction costs, interconnection costs, and all other project related costs, including costs impacted by construction duration."

[81] "Prudence: The Signatories agree that they shall not challenge the prudence of the decision to construct the facility for RES compliance purposes under Section 393.1030, RSMo., and to merge Outlaw Wind Project, LLC into Ameren Missouri upon acquisition of the facility. Nothing in this Stipulation limits the ability of any Signatory or other party from challenging the prudency of the design, construction costs, interconnection costs, and all other project related costs, including costs impacted by construction duration."

recommendation to the Commission as to whether the new unit is fully operational and used for service; therefore, operational tests must be established and performed. Staff refers to these operational tests or requirements as in-service criteria.

The Commission has used in-service testing since at least 1978, after Section 393.135 went into effect in 1976, to determine whether the inclusion of a facility in rates is just and reasonable. Section 393.135, RSMo. 2016 states:

> Any charge made or demanded by an electrical corporation for service, or in connection therewith, which is based on the costs of construction in progress upon any existing or new facility of the electrical corporation, or any other cost associated with owning, operating, maintaining, or financing any property before it is **fully operational and used for service, is unjust and unreasonable, and is prohibited**. [Emphasis added.]

In-service testing has been completed on a wide range of generating plant types and specific plant upgrades, such as environmental retrofits. Staff typically recommends similar tests across types of generating plant types (i.e. base load, intermediate, and peaking), however each specific plant type may also have different tests unique to the specific generating unit. Staff also commonly recommends criteria which applies to all generating plants and environmental retrofits, such as, that all major construction work is complete.

Staff includes certain tests that will give an indication of how a new unit will perform under various conditions. Staff recommends several criterion, which in combination are needed to determine that a unit is both fully operational and used for service. Certain fundamental tests are included to prove whether the unit can start properly, shut down properly, operate at its full design capacity, operate for a period of time without tripping off line, operate at multiple load points, or operate at its design minimum load point. Other items Staff would consider are whether the unit can meet the emissions requirements, and whether the full output of the unit can be delivered into the electrical distribution/transmission system. An additional factor Staff will consider is whether contractual testing has been performed prior to the company accepting the unit.

There have been instances where the Commission determined a generating plant was used for service but not fully operational. An early case in which the Commission considered in-

service criteria specifically was Case No. ER-79-60, a rate case in which the date of Jeffery Energy Center Unit 1 becoming fully operational and used for service was at issue. In that case, the Commission found that even though the Jeffery Energy Center Unit 1 was used for service, it must also be fully operational prior to inclusion in rates.

B. Wind In-Service

Staff and Ameren Missouri agreed to in-service criteria to be used for the Atchison and High Prairie Wind Farms as a part of the respective certificate of convenience and necessity (CCN) cases.[82] Staff witnesses Shawn E. Lange, PE and J Luebbert present the status of Engineering Analysis' evaluation and recommendation in the attached Construction Audit report, Appendix 5.

C. Solar In-Service

The solar in-service criteria includes the typical criterion that Staff always includes, such as all major construction work is complete and whether there are sufficient distribution assets for the facility. In addition to confirmation that the solar facility is producing energy, the solar in-service testing includes a capacity test. This test evaluates the system's power generating capability. Solar generation has inherent uncertainties related to weather conditions such as temperature, irradiance, and seasonal variability. The benefit of the capacity test is that it is a shorter-duration test, which corrects for these weather conditions.

D. BJC Solar

In late 2016, Ameren Missouri received approval to offer a distributed solar pilot, which involved partnering with local businesses to install Ameren Missouri-owned solar (EA-2016-0208). Ameren Missouri partnered with Barnes-Jewish Hospital to install an approximately 1.818 MW DC[83] facility on top of a parking garage at 4456 Duncan Avenue.[84] The BJC solar facility includes solar panels mounted on a steel canopy (carport) and inverters. Capacity testing of the solar facility was being conducted toward the end of the last Ameren Missouri rate case, ER-2019-0335, therefore, it was stipulated that "[t]he solar facility

[82] Case Nos. EA-2018-0181 and EA-2018-0202.
[83] Approximately 1.57 MW AC.
[84] Site Documentation in EA-2016-0208 indicated the address was 4466 Duncan, however, the location is 4456 Duncan per response to Staff DR No. 0422.

installed at the BJC Healthcare site shall not be included in rates until in-service criteria contained in Exhibit H are shown in a future general rate proceeding to be satisfied."[85] Appendix 3, Schedule CME-d1 provides the in-service criteria for this facility and Staff's review. Staff concludes that the BJC solar facility is now fully operational and used and useful for service.

E. South St. Louis Renewable Energy Center

A parking structure mounted solar facility at the Habitat for Humanity headquarters in St. Louis, MO is nearing completion. The South St. Louis Renewable Energy Center is a 192 kW-AC solar facility[86] and part of Ameren Missouri's Neighborhood Solar program. The South St. Louis Renewable Energy Center consists of solar panels mounted on canopy structures and inverters. Ameren Missouri was not required to seek a CCN for this facility per 393.1665.3 RSMo, which requires certain electric utilities to spend $14 million on solar projects. This project represents approximately ** [redacted] ** of the required $14 million. Staff proposes to utilize the in-service criteria in Schedule CME-d1 for this facility. ** [redacted] **[87] Staff proposes Ameren Missouri demonstrate that the South St. Louis Renewable Energy Center meets the in-service criteria contained in Schedule CME-d1 by the true-up cutoff date, September 30, 2021, in order to include the solar facilities in rate base.

F. Future Solar Projects

Ameren Missouri is planning to construct a 6.16 MW-AC solar facility in Montgomery County, MO to support its Community Solar program and an additional 1.2 MW-AC project at Southeast Missouri State University for the Neighborhood Solar program. These two facilities are expected to be complete in late 2021 and 2022, respectively.[88] Ameren Missouri and Staff recently filed in-service criteria to use for the future Montgomery Solar Facility approved as part

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[85] Order Approving Stipulation and Agreements in ER-2019-0335.
[86] Response to Staff DR No. 0043.1.
[87] ** [redacted] **
[88] 2021 Q1 Community Solar PSC Report in EA-2020-0371 and Response to Staff DR No. 0434.

of Case No. EA-2020-0371. These projects will not be completed prior to the true-up cutoff in this current rate case and as such will not be considered in this case.

Staff Expert/Witness: Claire M. Eubanks, PE

X. Facilities and Donations

During its review in Ameren Missouri's last gas rate case (GR-2019-0077), Staff learned that Ameren Missouri initiated a facility action plan that received ** [redacted]. ** The plan called for an evaluation of all facilities with the goal of either combing facilities or exiting older facilities to reduce the number of facilities that were owned or leased by Ameren Missouri for its electric and gas operations. In this case, Staff has reviewed any facilities changes made by Ameren Missouri since its last rate filing and is recommending the following adjustments:

A. Bank of America Lease

In July of 2021, Ameren Missouri was able to cancel the lease for the swing space located at the Bank of America Building at 800 Market Street in downtown St. Louis. The swing space was initially leased to allow for extra space while Ameren Missouri completed renovations on its general office building. Due to COVID-19, Ameren Missouri shifted non-essential employees to remote working conditions and was able to accelerate the renovations of the general office building; additionally the leased space was no longer necessary due to Ameren Missouri and Ameren Services employees being able to work from home. Staff has made an adjustment to remove all costs and revenues associated with the leased space and the associated parking garage from the test year.

B. Eldon Transmission Building

In October of 2019 Ameren sold the property located in Eldon Missouri, which was split between two buildings. During a meeting with Staff it was confirmed that the property was sold and no longer in use, however Ameren Missouri neglected to remove the plant from service for the transmission building that was located in Eldon Missouri. Staff has made an adjustment to remove the land and structures from rate base. Staff has also removed the O&M costs that were charged to the building during the test year.

C. Sunset Hills Office

** [redacted][89] [redacted] ** Staff has submitted DR Nos. 0758 and 0760 seeking additional information regarding the facility.

D. Edina Facility

During the test year, Ameren Missouri retired the old Edina facility at 204 E. Fulton in Edina, MO and replaced it with a new facility at 402 Fulton in Edina, MO. Ameren Missouri did not move the old Edina facility to non-utility property until June of 2021, therefore Staff has included an adjustment to remove the old facility from rates until rate base is updated as part of the true-up audit. As of this filing, Ameren Missouri has the old Edina facility on the market and Staff may propose an adjustment to calculate any gain on the sale of the old Edina facility to offset the new higher costs of the new facility in a future rate case.

E. Eldon and Versailles O&M Costs

Staff has removed the O&M Costs for the Eldon and Versailles facilities that were incurred during the test year as these facilities were sold and no longer in service.

F. Saint Louis University ("SLU") Donation

During the course of its review during Ameren Missouri's last general rate case, (ER-2019-0335 Staff discovered that Ameren Missouri had planned to donate the site of the former central substation in midtown St. Louis to SLU during the fourth quarter of 2019. The donation was completed in the fourth quarter of 2019, and Ameren Missouri was credited with a donation to SLU in the value of the appraised property.[90]

[89] The facility was placed on the market in May of 2021.
[90] $1,095,000.

Prior to the donation to SLU, the university had approached Ameren Missouri regarding purchasing the land and had offered to purchase the land for $913,020. During the negotiations for the sale of the land, SLU approached Ameren Missouri to see if they would be willing to donate the land to SLU as part of the university's fundraising campaign. Ultimately, the decision was approved to donate the land to SLU rather than make a cash contribution to the campaign. The replacement substation, which is located less than one mile from the donated site was constructed on land purchased by Ameren Missouri for ** [redacted] ** and additional costs were necessary to prepare the site for the substation. In total, the replacement substation went into service in November of 2012, with a capital cost of $22.2 million.

As part of its rebuttal testimony in the previous case (ER-2019-0335), Staff proposed an adjustment to reduce the value of the land for the replacement substation by the amount of the gain Ameren Missouri would have received by selling the land to SLU, less the costs incurred by Ameren Missouri to prepare the site for sale/donation. Staff is proposing the same adjustment in this case, as it relates to rate base and what was addressed in the stipulation and agreement filed in the prior Ameren Missouri rate proceeding. Staff contends that it was inappropriate and imprudent for Ameren Missouri to donate property that was included in rates without Commission consent and without giving consideration to ratepayers when the proceeds of the sale could have been used to offset the construction of the replacement substation site.

Staff Expert/Witness: Jason Kunst, CPA

XI. Allocations

A. Corporate Allocations

A subsidiary of Ameren Corporation, Ameren Services Company (Ameren Services), provides various management and administrative support services to Ameren Missouri and affiliate companies. As part of its audit process, Staff reviewed the methods used by Ameren Services to assign and allocate costs to Ameren Missouri's electric and gas operations. Under Ameren Services' corporate cost allocation system, costs are categorized into four types:

1) Direct – Costs that can be identified as being applicable to products or services provided to a single affiliate;

2) Direct Allocated – Costs that can identified as being applicable to products or services provided to two or more affiliates;

3) Functional Indirect – Costs such as office supplies and administrative labor accumulated by functional area and allocated to all affiliates based on the ratio of total direct and direct allocated costs charged to each affiliate;

4) Corporate Indirect – Costs such as the Service Company's banking activities and rent allocated based on the ratio of total direct and directly allocated costs charged to each affiliate.

The allocation of costs and methods used to allocate costs from Ameren Services are outlined in Ameren Missouri's cost allocation manual (CAM) in Appendix 3, Tab Q filed May 14, 2021 under Tracking No. BAFT-2021-1870 in the Commission's Electronic Filing Information System (EFIS).

Ameren Missouri filed a CAM in Case No. EO-2017-0176, however that CAM has yet to be approved. On June 17, 2018, Staff filed a motion to open a working docket, Case No. AW-2018-0394, for a review and consideration of rewriting of existing and writing of new Affiliate Transaction Rules. On August 16, 2019, Staff and Ameren Missouri filed a Motion to Stay the proceedings of Case No. EO-2017-0176 until completion of the workshop docket and a formal rulemaking respecting the Affiliate Transaction Rules.

In Case No. ER-2019-0335, the parties agreed that Ameren Missouri would file or provide (concurrently with its provision of direct case workpapers) the following items with regard to affiliate transactions in its next general rate case (this proceeding):

1. The total amount of affiliate transactions charges to Ameren Missouri and affiliate transactions charges by Ameren Missouri to an affiliate in the test year, by account and affiliate.
2. The Fully Distributed Cost Study (the "FDC Study") being conducted as agreed upon with the Staff as provided in the Non-Unanimous Stipulation and Agreement submitted in File No. EO-2017-0176 (the "EO-2017-0176 Stipulation").
3. To the extent the FDC Study did not study the fully distributed cost of Ameren Missouri to itself to perform a function currently performed by Ameren Services Company ("AMS") (legal, human resources, accounting, etc.), and only studied costs to AMS, a detailed explanation for each function that demonstrates why an FDC study for Ameren Missouri is not necessary or reasonable.

4. Where benchmarking is used to assess AMS costs: (1) a detailed description of how Ameren performed or obtained its benchmarking; (2) identification of all benchmarking results and any steps taken to address the results; and (3) all associated AMS or Ameren Missouri work-papers and supporting documents.
5. Identification of all affiliate transaction costs in the test year that were incurred by Ameren Missouri following a request for proposal issued by or on Ameren Missouri's behalf and receipt of bids.
6. Identification of all affiliate transaction costs in the test year that were incurred by Ameren Missouri without a request for proposal issued by or on Ameren Missouri's behalf and receipt of bids, and an explanation of why competitive bidding was not necessary.
7. Identification of Ameren Corporation board of director and investor relations costs being charged to Ameren Missouri through an allocation process, and a detailed explanation of the allocation factors or process by which the charges are allocated to Ameren Missouri.
8. The General Office Building space study as provided for in the EO-2017-0176 Stipulation.
9. Year-end Ameren Missouri and AMS employee organization charts showing all position at year end 2019, it being agreed that the "organization charts" can consists of a spreadsheet all such employees and their titles, by employer.

Staff verified that Ameren Missouri provided all of the above items except for Items 5 and 6. Ameren Missouri claims no costs fall into either category and thus did not identify the costs.

Ameren Services evaluates and updates the allocation factors included in the Ameren Missouri CAM at the beginning of each calendar year, unless there is a significant change in circumstances that would require the allocation factors be updated immediately. Ameren Services' Service Request Manual requires that Ameren Services' Internal Audit Department perform an audit and report each year of Ameren Service's Service Request System and Service Request policies, operating procedures, and controls.

1. 2021 Allocation Factors

Ameren Services made no significant changes to the allocation factors for 2021 and made no changes to include new or remove existing allocation factors.

Staff has proposed an adjustment to annualize the Ameren Services costs allocated to Ameren Missouri during the 12 months ending December 31, 2020, using the updated Ameren Services allocation factors for 2021.

Staff Expert/Witness: Kimberly K. Bolin

2. Software Allocations

Before January 1, 2017, Ameren Corporation software assets were owned entirely by a subsidiary, such as Ameren Missouri, Ameren Illinois, or Ameren Transmission. An affiliate using the software was charged rental expense for its use, and the subsidiary owning the software recognized rental revenue. This policy was changed in 2017 to allow joint ownership between Ameren Missouri, Ameren Illinois, and Ameren Transmission of software assets. This eliminated the need for intercompany rental charges. Under the new policy, these affiliates agree to an ownership allocation percentage based on allocation factors and sign a joint ownership agreement for use of the software assets.

However, prior to May 2019 the use of the enterprise-wide software by affiliates other than Ameren Missouri, Ameren Illinois, and Ameren Transmission was not considered when developing joint allocation agreements. During its last gas rate case, GR-2019-0077, Ameren Missouri acknowledged that although prospectively, use of the software assets would be allocated to affiliates enterprise-wide, no adjustment would be made to prior agreements to allocate assets to affiliates other than Ameren Missouri, Ameren Illinois, and Ameren Transmission. In Ameren Missouri's last electric rate case, ER-2019-0335, Ameren Missouri agreed to remove a percentage of enterprise-wide software from rate base and to remove the associated amortization that represents the aggregate usage of Ameren Corporation's other subsidiaries.

In response to Staff DR No. 0204.3, in this current electric case, Ameren Missouri provided recording entries of adjustments that removed a portion of shared software and reallocated them to Ameren Corporation. Staff reviewed plant and reserve amounts associated

with the shared software assets and they appear to be reasonable for inclusion in the rate base calculation. Staff will continue to review this issue through the true up cutoff date of September 30, 2021.

Staff Expert/Witness: Paul K. Amenthor

XII. Income Statement

A. Rate Revenues

1. Introduction

Since the largest component of operating revenues result from rates charged to retail customers by Ameren Missouri, comparing operating revenues to the cost of service is a fundamental test of the adequacy of the currently effective Missouri jurisdictional retail electricity rates. If the overall cost of providing service to Missouri retail customers exceeds Ameren Missouri's operating revenues, an increase in the current rates Ameren Missouri charges its Missouri retail customers for electricity is required. Conversely, if Ameren Missouri's operating revenues exceed the overall cost of providing service to Missouri retail customers, then a decrease in the current rates is warranted.

Staff Expert/Witness: Jason Kunst, CPA

a. Definitions

Operating Revenues are composed of Rate Revenue, Revenue from Energy and Capacity Sales and Other Operating Revenues. Each is defined respectively as follows:

Rate Revenues: Test year rate revenues consist solely of the revenues derived from the current rates Ameren Missouri charges for providing electric service to its Missouri retail customers (i.e., native load and customer charges). Ameren Missouri's charges are determined by multiplying each customer's usage by the per unit rates established in its tariff. During the year Ameren Missouri's retail customers are charged summer rates (June-September) and winter rates (October-May). These charges are broken down for Missouri retail customers into two categories: (1) a demand charge; and (2) an energy charge. Missouri retail customers' rates are additionally broken down by rate class based upon the type and amount of usage. These rate classes include: Residential, Small General Services, Large General Service, Small Primary Service, Large Primary Service, Public and Private Lighting. Additionally there is a separate

category for Metropolitan Sewer District ("MSD"), a large industrial customer. The revenues Ameren Missouri collects from its fuel adjustment clause ("FAC") represent the collections or refunds of prior period fuel costs and are excluded from the calculation of annualized ongoing rate revenues.

Revenue from Energy and Capacity Sales: Revenue from energy and capacity sales is realized as a result of Ameren Missouri's sale of electricity to other utilities at non-regulated prices. The gross revenue from these sales, less the generation or purchased power expense incurred by Ameren Missouri to make these sales, is the profit margin on energy and capacity sales. The rationale for assigning the profit margin on energy and capacity sales to ratepayers and including it in operating revenues is that the electricity sold by Ameren Missouri is generated by power plants that are being paid for by ratepayers through the electric rates charged by Ameren Missouri.

Other Operating Revenues: This category includes the various revenues Ameren Missouri collects from charges such as rental income from affiliates, rental of pole space, and other miscellaneous charges.

Staff Expert/Witness: Jason Kunst, CPA

2. Regulatory Adjustments to Test Year Sales and Rate Revenue

a. Remove Unbilled Revenues

Staff has made an adjustment to remove unbilled revenues from its calculation of the revenue requirement. The recording of unbilled revenue to the books of Ameren Missouri recognizes the sales of electricity that have occurred, but have not yet been billed to the customer. Therefore, it is necessary to remove unbilled revenue in order to accurately determine the revenue requirement based upon electricity sales actually billed to customers to ensure that only 365 days of revenue are included in the calculation of normalized and annualized revenues.

Staff Expert/Witness: Jason Kunst, CPA

b. Remove Gross Receipts Tax

Ameren Missouri acts as tax collector for certain taxes imposed on utility service revenues by municipalities and other taxing authorities. These taxes include gross receipt taxes ("GRT"), which Ameren Missouri collects from customers and passes on to the appropriate

taxing authority. Since GRT is a pass through item, Staff has made an adjustment to remove the test year amounts from both Ameren Missouri's revenues and expenses in the cost-of-service calculation; however because of timing differences the adjustments may be similar but are not identical. The elimination of both the expense and revenues associated with the GRTs ensures that there will be no impact on the calculation of net income for revenue requirement purposes.

Staff Expert/Witness: Jason Kunst, CPA

c. Adjustment to Eliminate MEEIA Revenue

The Missouri Energy Efficiency Investment Act ("MEEIA") was passed by the Missouri legislature and signed into law by the governor in 2009. The MEEIA program is designed to encourage Missouri's investor-owned electric utilities to offer energy efficiency programs and projects designed to reduce the amount of electricity used by the utility's customers. Commission rule 20 CSR 4240-20.093 makes available a Demand-Side Program Investment Mechanism that allows for the periodic rate recovery of MEEIA program costs, recovery of lost revenues related the programs, and a utility performance incentive for investment in demand side programs. As these program costs are recovered though the MEEIA Rate Rider mechanism rather than base rates, it is necessary to make an adjustment to exclude the MEEIA revenues from the calculation of electric retail revenues in the cost-of-service calculation.

Staff Expert/Witness: Jason Kunst, CPA

d. RESRAM Revenue Removal

In Case No. EA-2018-0202, the Commission approved Ameren Missouri's request for a RESRAM which allows Ameren Missouri to recovery RES related capital investment and expenses through a rider mechanism between rate cases. As these RES related costs will be rebased into current rates in this case, it is necessary to make an adjustment to remove these revenues from the calculation of normalized and annualized revenues.

Staff Expert/Witness: Jason Kunst, CPA

e. Removal of FAC Revenues

Ameren Missouri's fuel costs are currently collected through a fuel adjustment clause ("FAC"). In order to reflect a normal ongoing level of actual billed revenue, it is necessary to remove FAC revenue that was recording during the test year.

Staff Expert/Witness: Jason Kunst, CPA

f. Removal of Rate Refunds

Ameren Missouri's fuel costs are currently recovered through the FAC. The provision for rate refunds can be an accrual for any possible over or under-collection that may occur since the previous FAC filing. As these revenues are considered within Ameren Missouri's FAC filings and not a part of permanent rate calculations, it is necessary to remove them to reflect an accurate revenue requirement for ratemaking purposes.

Staff Expert/Witness: Jason Kunst, CPA

g. Removal of Loss on Disposition of Allowances

During the test year, Ameren Missouri recorded a loss on the sale of sulfur dioxide (SO2) allowances. Staff is proposing an adjustment to eliminate this loss as it relates to a non-recurring revenue stream, to properly reflect actual billed retail revenues and non-retail revenues that are recognized for revenue normalization purposes.

Staff Expert/Witness: Jason Kunst, CPA

3. <u>The Development of Rate Revenue in this Case</u>

This section discusses Staff's determined normalized and annualized test year usage and revenues by rate class. The intent of Staff's adjustments is to determine the level of revenue that Ameren Missouri would have collected on an annual, normal-weather basis, based on information "known and measurable" at the end of the test year December 31, 2020 and in this case, updated through April 30, 2021, as explained below. The two major categories of revenue adjustments are known as "normalization" and "annualization." Normalizations deal with test year events that are unusual and unlikely to be repeated in the years when the new rates from this case are in effect. Test year weather is an example. Annualizations are adjustments that re-state test year results as if conditions known at the end of the test year had existed throughout the entire test year. Adjustments for customer growth are an example of an annualization.

Staff Expert/Witness: Kim Cox

a. Update Period Adjustment

The purpose of the update period adjustment is to provide a more current level of normalized and annualized customer usage data, referred to as billing determinants, in which to establish rates in this case. In this case Staff was able to update billing determinants to reflect the 12-month period ending April 30, 2021. Billing determinants are the detailed customer usage

data for each rate schedule that are necessary to calculate retail rate revenue for each rate schedule charge type. For example, if a rate schedule consists of a customer charge billed per customer, an energy charge billed per kWh and a demand charge billed per kW, then the billing determinants should consist of the number of customers, number of kWh sold at each level of energy charge and the level of customer kW subject to each type of demand charge.

Staff Expert/Witness: Kim Cox

b. Economic Development Incentive Rider

An Economic Development Incentive (EDI) discount on base rates is available to qualifying new or expanding industrial customers for up to five years. The Rider offers incentive, in conjunction with other Economic Development programs, to attract new and developing businesses in Missouri. Customers must sign an agreement contract with the Company which specifies a discount rate per contract year averaging 40% over the five years. A Beneficial Location of Facilities (BLF) discount is also offered to customers taking service from an under-utilized circuit. Discount is available to qualifying customers for one year after the Rider EDI discount ends. The BLF discount is a 10% reduction in base rate.

Staff reviews (EDI) Rider information submitted by the Company, upon execution of an EDI agreement with a customer, ensuring EDI Rider tariff requirements are met. This information is updated during a rate case and Staff verifies that calculations and information provided by the Company are correct, reasonable and comply with tariff requirements.

Staff uses EDI discount amounts to make an adjustment to rate class revenues in rate cases to reflect the value of the discount. Based on data provided by the Company, adjustments to rate class revenues to reflect EDI Rider Discounts for the 2020 calendar year test period were a reduction in revenue of $81,119 for the Large General Service (LGS) class and $84,558 for the Small Primary Service (SPS) class, for a total EDI Discount of $165,677.

continued on next page

EDI Rider Discount Adjustoment
2020 Calendar Year Test Period
(reduction to revenue)

	raw data	12 mo adj.
LGS	82,002	81,119
SPS	84,558	84,558
Total EDI Discount Adj.		165,677

EDI Discount data was adjusted by Staff to reflect 12 months of discounts for all customers served on the EDI tariff. Staff will review EDI discounts through the true-up period and will make any additional adjustments in its true-up filing in this case.

When reviewing individual customer EDI data, Staff would like to point out that the Load Factor calculation provided by the Company for ** [redacted] ** did not follow the Load Factor formula in the tariff. Staff's calculation of Load Factor for this customer is 54.04% which is below the tariff required 55% minimum. Staff is aware that this customer is still in the process of expanding service and will likely meet the minimum requirement by the end of the second contract year, April 3, 2022, as the tariff specifies.

Staff has no other recommendations or disallowances at this time.

Staff Expert/Witness: Nancy L. Harris

c. Customer Growth Adjustment

Staff made adjustments to reflect the impact in the change of customer levels on test period kWh sales, kW demand,[91] and revenues. Staff's customer growth adjustment reflects the level of kWh sales, kW demand and rate revenues that would have occurred if the number of customers taking service at the end of April 30, 2021, had existed throughout the test year.

[91] Class kW demand was only adjusted for the Large General Service and Small Primary Service classes that have demand charges.

Staff has calculated customer growth for the following customer classes: Residential, Small General Service, Large General Service and Small Primary Service. The customer growth adjustment takes into account normalized weather usage, as well as the adjustment for 365 days and rate changes that occurred during the test year.

Customer classes that did not exhibit growth remain at unadjusted t levels, and they are: Outdoor lighting and Metropolitan Sewer District (MSD). As part of its true-up audit, Staff will review customer growth through September 30, 2021, true-up cut-off and make adjustments as necessary to reflect the change in customer levels.

Staff Expert/Witness: Kim Cox

d. Community Solar Adjustment

Staff made an annualization adjustment for community solar. Each solar block a customer signs up for is equivalent to 100 kWh reduction on their metered usage billed on Residential basic service rates. Staff adjusted the usage and revenues for Residential basic service rate class by 100 kWh per each solar blocks purchased. Staff used the monthly subscribed solar blocks provided by Ameren Missouri to adjust the Residential basic rate class revenues. Lastly, Staff priced out the solar block kWh at the Community Solar rate. Staff witness, Lisa M. Ferguson discusses this further in her testimony in the Community Solar section.

Staff Expert/Witness: Kim Cox

e. PAYS Revenue

The Company's response to Staff DR No. 0507 states that the Company has not collected any revenue from participants bills from January 2020 through April 2021. Staff anticipates updating revenues through the true-up period.

Staff Expert/Witness: Kim Cox

f. Seasonal Proration Adjustment

Ameren Missouri tariff sheet number 130, A. states:

> Where bills are rendered for periods of use in excess of or less than the period provided for herein, all base rate components will be prorated. Beginning in calendar year 2021, summer rates will be

> applicable for service rendered from June 1st through September 30th. Where a bill includes any portion of both Summer and Winter periods the rate application will be prorated.

Staff utilized billing cycle sales to best quantify the level of usage that had previously been billed on winter rates, but would be billed on summer rates and vice versa due to the Company's proration starting on June 1, 2021. Staff then took the net change in kWh and multiplied it by the average change in the seasonal rate to derive a revenue adjustment for bills that included any portion of both Summer (June 1st through September 30th) and Winter (October 1st through May 31st) periods. Staff performed this calculation using the level of usage information available to Staff. Staff requested a more precise calculation from the Company, but Staff's Data Request was objected to by the Company and to date the Company has not provided a more precise calculation. Staff anticipates updating the seasonal proration based on additional information from Company if the Company provides additional information. For example, Staff currently has only estimated the impact of the proration on kWh sales, but kW demands will also be necessary for the non-residential classes where the demand charge is also prorated. Staff estimates that the impact of the proration on only kWh sales is estimated to be approximately $8,807,969.[92]

Staff Expert/Witness: Robin Kliethermes

g. Large Customer Annualization

For Staff's calculation of the Large Primary Service (LPS) class retail rate revenues, Staff utilized the test year ending December 31, 2020 and updated through April 30, 2021 to provide a more current basis for normalization, annualization, and growth calculations. There were 63 customers in the LPS rate class during at the 12 months ending April 30, 2021. Staff performed a data check for billing corrections prior to doing other adjustments and reviewed LPS customers on an individual customer (account) basis. The LPS customer adjustments are as follows:

[92] After the preparation of this testimony, Ameren Missouri responded to Staff DR No. 0554 which was submitted to the Company 78 days prior to Ameren Missouri's response. Staff has not yet reviewed the data provided.

Annualization

The general intent of an annualization is to restate the billing units as if conditions known at the end of the 12 months ending April 30, 2021 had existed throughout the entire time period taken into consideration. Staff reviews each of Ameren Missouri's largest customers to determine if adjustments need to be made to reflect any major growth or decline in kWh usage and rate revenues due to the entrance of new customers, the exit of existing customers, and load growth or decline of specific existing customers. Staff annualized these customers' billing units and revenues for all twelve (12) months. During the update period, one customer moved into the Large Primary Service (LPS) rate class from Small Primary Service (SPS) class, and one LPS customers moved to the SPS class. Therefore, Staff proposed adjustments to account for the new customer joining the LPS class and the customer leaving the LPS class.

Weather Normalization

Staff normalized update period usage data provided by Ameren Missouri by applying weather normalization factors calculated by Staff witness Michael L. Stahlman for each month. Staff adjusted the billing units by these factors, and applied current rates to determine weather-normalized revenue. The difference between these weather-normalized revenues and the update period revenues determined the amount of the Weather Normalization Adjustment.

365-Days Adjustment

Staff normalized the update period usage so that the test period included usage reflective of 365 days for each customer. Staff witness Michael L. Stahlman calculated the 365-day adjustment. The adjustment was added to Staff's overall weather normalization factor and applied to LPS customer usage by month to calculate the overall revenue adjustment.

COVID-19 Normalization

Staff looked at the historical usage for each individual LPS customer through April 30, 2021 to determine if the customer experienced a change in kWh usage and kW demand due to COVID. Staff found that two customers were impacted and adjusted the customers' usage to reflect an average of pre- and post-COVID usage and demand. This adjustment is consistent with the Company's COVID-19 adjustment for the LPS class.

Staff Expert/Witness: Joseph P. Roling

h. MEEIA Annualization

The Stipulation and Agreement in File No. EO-2018-0211 requires that, during a rate case, an adjustment be made to account for energy efficiency measures that were installed during the test period. Staff annualized that level of energy efficiency (EE) savings that occurred at the end of the year as if they had occurred throughout the year. In Staff's review of the Company's EE measures, Staff found that the Company's online store allowed customers to purchase more than 2 thermostats over a 12 month period. Staff made an adjustment to the overall level of EE savings to remove a level of estimated deemed savings attributable to thermostats in excess of 2 received by an individual customer. This adjustment was made because Ameren Missouri's Technical Resource Manual ("TRM"), which is used to calculate the saving attributable to a thermostat, does not define the level of square footage included in the savings calculation but rather uses an average household. For Ameren Missouri's demand response program, customers should only be allowed to register 2 thermostats or one per HVAC system per the program tariff. Seemingly, the savings attributable to one thermostat per household will be different per additional thermostat added. Based on a review of the TRM, there is currently not a different level of savings attributable to additional thermostats in excess of 1 per HVAC system. Staff has requested further information from the Company and is still reviewing the level of EE measures allowed to be purchased at discounted prices by a single customer through Ameren Missouri's online store. Staff anticipates revising the EE adjustment through the true-up period.

Staff witness Robin Kliethermes provided total kWh adjustment for the Res, SGS, LGS, and SPS classes to Staff witness Kim Cox. The kWh adjustments were equally applied to all rate blocks.

Staff Expert/Witness: Kim Cox

i. Weather Normalization of Revenue and 365 Day Adjustment

Staff normalized and annualized update period usage data provided by Ameren Missouri for the Res, SGS, LGS and SPS rate classes. Staff did not adjust the Outdoor lighting rate class or the Metropolitan Sewer District rate class since weather does not affect the usage of these classes. Staff witness Joseph P. Roling discusses the weather normalization and 365 days adjustment for the LP class.

The Residential basic service rate class consists of a seasonal differentiated energy charge for summer and winter. The summer energy charge (June 1- September 30 billing period) is billed at a flat non-blocked energy rate. The winter energy charge (October 1-May 1 billing period) is billed using a two block rate. The first rate block applies to the first 750 kWh used in a billing period and second block is applied to all kWh billed in excess of 750 kWh. For the Residential basic service rate class, the weather adjustment factor was combined with the 365-day adjustment factor that was provided by Staff witness Michael L. Stahlman. Mr. Stahlman explains how the factors are derived in the weather normalization section below. Staff applied the combined factor to all usage for the summer months. However, for the winter months Staff applied the weather adjustment differently than the summer months because not all customers will have usage billed in the second rate block, so it is not appropriate to spread normalized kWh equally to the winter rate blocks. Staff used the cumulative frequency bill distribution data provided by Ameren Missouri to determine the appropriate percentage of normalized winter block usage. The percentages were then applied to monthly usage per customer before and after the weather and 365-day adjustments using the normalization factors provided by Staff witness Michael L. Stahlman. This computation resulted in normalized usage by rate block, which was then converted to the total normalized revenues by multiplying rate block usage by the appropriate rates found in Ameren Missouri's effective tariff sheets.[93]

For the Residential time of use rate classes, Staff applied the combined weather adjustment factor and 365-day adjustment factor to each rate block by an equal percent.

The SGS class consists of a customer charge and an energy charge that includes a seasonal energy charge distinction in the winter months.[94] However, the seasonal energy charge distinction is not defined by a specific level of customer usage in a given billing month as done for the Residential class but rather the level of customer usage in a given winter month compared to the customer's summer month usage. Therefore, Staff used a simple linear regression to quantify the relationship between the change in usage and the percent of usage billed in the first

[93] As customers transfer to the default or Ameren Missouri's other time-of – use (TOU) rate options established in Ameren Missouri's last rate case, Case No. ER-2019-0335, Staff will continue to review its method for applying weather normalization adjustments based on the various rate designs. At the time of the test period the majority of Residential customers were still served on Ameren Missouri's basic service rate and not on a TOU rate.
[94] Winter months for SGS are defined the same as the Residential class.

winter rate block or non-seasonal rate block. Staff applied the regression results to the 12 months ending April 2021.

For the LGS and SPS class the weather adjustment factor was combined with the 365-day adjustment factor and applied to each energy rate block by an equal percent. The LGS and SPS rate classes are billed using energy and demand charges. The energy charge rate blocks are separated based on the customer's relationship between kWh usage and kW demand in each month. Since kW demand is not weather normalized the weather adjustment was applied to each energy block by an equal percent. The difference between these normalized and annualized revenues and the update period revenues determined the amount of the overall revenue adjustment.

Staff Expert/Witness: Kim Cox

j. 365-Days Adjustment to Usage

Calendar months and revenue months differ from one another because of the periods they cover and the differing beginning and ending times. Calendar months coincide with the calendar, beginning on the first day of the month and ending on the last day of the month. Ameren Missouri's customers' usage is measured and rate revenues are collected over a period known as a revenue month, which is the interval over which Ameren Missouri reads customers' meters and issues bills. A bill rendered for a given revenue month may charge for usage in parts of two calendar months. Revenue months usually take their names from the calendar month in which the customer's bill is rendered. For example, assume a customer's meter was read and usage determined on June 8 and then again on July 8 and that the bill was sent to the customer on July 15. The revenue month for this bill is July even though 22 days of the usage measured for this bill occurred from June 9 through June 30 and it contained only eight days of usage in July.[95]

The length of a revenue month is dependent upon the interval between meter readings and does not necessarily have the same number of days that occur in a given calendar month of the same name; that is, a revenue month may have more than or less than the number of days for

[95] Primary months are used to distinguish in which month the usage is billed under and whether summer or winter rates apply. For example, a customer's sixth bill of the year is deemed the customer's June bill even if it is billed to the customer on May 29. In this example, the primary month is June and the summer rate will apply to all usage on the bill, even though the revenue month would be May.

the same-named calendar month. For the example given above, the usage is for 30 days (June 9 through July 8), even though the revenue month is July, which has 31 days. When revenue month usage is totaled over the year, the resulting revenue year will include usage from the immediately prior calendar year and assign usage to the next calendar year, meaning a revenue year may contain more than or less than 365 days' usage. Therefore, since the costs and expenses are accounted over a calendar year, Staff calculates an annualization adjustment to bring the revenue year kWh into a 365-days interval. This adjustment is stated in kWh and is referred to as the 365-Days Adjustment. Staff calculated the 365-Days Adjustment by adjusting individual bill cycles that had more than or less than 365 days' usage from the first date in that cycle's revenue test year to the last meter read date in that cycle's revenue test year. The overall average usage per day of that cycle was then multiplied by the days over/under 365 days to determine the kWh adjustment.

The 365-Days Adjustment for RES, SGS, LGS, SPS, and LPS were provided to Staff witness Kim Cox, who used the 365-Days Adjustment to adjust the revenues of the weather-normalized class revenues months to the twelve months ended April 30, 2021.

Staff Expert/Witness: Michael L. Stahlman

k. Weather Normalization

In many of the classes of service, electricity consumption is highly responsive to the weather, specifically temperature. As the temperature reaches higher levels, the demand for cooling, air conditioning and fans increases the customers' consumption of electricity. As the weather becomes colder, the demand for additional heating, via electric space heating, also forces an increase in electricity consumption. Electric air conditioning and space heating is prevalent in Ameren Missouri's service territory; therefore, it follows that Ameren Missouri's electric load is linked with and responsive to temperature.

Ameren Missouri's test year ran from January 1, 2020, through December 31, 2020. In an attempt to capture a more likely forward-looking indictor of non-weather electricity usage per customer, Staff decided to use the most recent temperature and load data available and, therefore, based its analysis on the twelve months of May 1, 2020, through April 30, 2021.

For the update period, Staff's weather analysis showed an overall warmer than normal year. The months of May 2020 through October 2020 were generally slightly cooler than normal and the months of November 2020 through April 2021 were generally warmer than normal with the notable exception of February 2021, which was much colder than normal.

The method and model used by Staff is similar to those used by Ameren Missouri. Staff's model and method contained elements important in the class-level weather normalization process: use of daily load research data to determine non-linear, class-specific responses to changes in temperature with the incorporation of different base usage parameters to account for different days of the week, months of the year and holidays. The results of Staff's analysis were provided to Staff witness Kim Cox to be used in the normalization of revenues for weather sensitive classes, Residential (RES), Small General Service (SGS), Large General Service (LGS), Small Primary Service (SPS) and Large Primary Service (LPS).

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i. Weather Variables

Historical Data Used to Calculate Weather Variables - Each year's weather is unique; consequently, test year usage, hourly loads, revenue, and fuel and purchased power expense need to be adjusted to "normal" weather so that rates will be designed on the basis of normal weather rather than any anomalous weather in the test year. In the quantification of the relationship between test year weather and energy sales, Staff used weather observations of Lambert - St. Louis International Airport ("STL"), Missouri for the twelve months of May 1, 2020, through April 30, 2021.

Weather Variables - Staff obtained weather data from the Midwest Regional Climate Center (MRCC). Weather data of St Louis Lambert International Airport ("STL") was used for the service territory of Ameren Missouri due to the availability and reliability of the weather data as well as their approximate location to Ameren Gas's customer base. The weather data sets consist of actual daily maximum temperature ("Tmax") and daily minimum temperature ("Tmin") observations. Staff used these daily temperatures to develop a set of mean daily temperature ("MDT") values.

Normal Weather - According to the National Oceanic and Atmospheric Administration ("NOAA"), a climate "normal" is defined as the arithmetic mean of a climatological element computed over three consecutive decades.[96] In developing climate normal temperatures, the NOAA focuses on the monthly maximum and minimum temperature time series to produce the serially-complete monthly temperature ("SCMT") data series.[97]

Staff utilized the SCMT published in July 2011 by the National Climatic Data Center ("NCDC") of the NOAA. For the purposes of normalizing the test year electric usage and revenues, Staff used the adjusted T_{max} and T_{min} daily temperature series for the 30-year period of January 1, 1988, through December 31, 2017, at STL. NOAA has updated the 30-year normal period to end in 2020 in May 2021, but Staff has not been able to analyze the SCMT for the most recent period. AS discussed below, the SCMT is based on the NOAA 30-year normal period ending 2010, with observed data through 2017.

There may be circumstances under which inconsistencies and biases in the 30-year time series of daily temperature observations occur, (e.g. such as the relocation, replacement, or recalibration of the weather instruments). Changes in observation procedures or in an instrument's environment may also occur during the 30-year period. The NOAA accounted for documented and undocumented anomalies in calculating its SCMT.[98] The meteorological and statistical procedures used in the NOAA's homogenization for removing documented and undocumented anomalies from the T_{max} and T_{min} monthly temperature series is explained in a peer-reviewed publication.[99]

Subsequent to determining the homogenized monthly temperature time series described above, the NOAA also calculates monthly normal temperature variables based on a 30-year normal period, e.g. maximum, minimum, and average temperatures. These monthly normals are not directly usable for Staff's purposes, because the NOAA daily normal temperatures values are

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[96] Retrieved on October 17, 2013, https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals.

[97] Retrieved on October 17, 2013, http://www1.ncdc.noaa.gov/pub/data/normals/1981-2010/source-datasets/.The SCMT, computed by the NOAA, includes adjustments to make the time series of daily temperatures homogeneous.

[98] Arguez, A., I. Durre, S. Applequist, R. S. Vose, M. F. Squires, X. Yin, R. R. Heim, Jr., and T. W. Owen, 2012: NOAA's 1981-2010 U.S. Climate Normals: An Overview. Bulletin of the American Meteorological Society, 93, 1687-1697.

[99] Menne, M.J., and C.N. Williams, Jr., (2009) Homogenization of temperature series via pairwise comparisons. *J. Climate*, **22**, 1700-1717.

derived by statistically "fitting" smooth curves through these monthly values.[100] As a result, the NOAA daily normal values reflect smooth transitions between seasons and do not directly relate to the 30-year time series of MDT as used by Staff. However, in order for Staff to develop adjustments to normal weather for electric usage, Staff must calculate a set of normal daily temperature values that reflect the actual daily and seasonal variability.

Staff used a ranking method to calculate normal weather estimates of daily normal temperature values, ranging from the temperature that is "normally" the hottest to the temperature that is "normally" the coldest, thus estimating "normal extremes." Staff ranked MDTs for each month of the 30-year history from hottest to coldest and then calculated the normal daily temperature values by averaging the ranked MDTs for each rank, irrespective of the calendar date. The ranking process results in the normal extreme being the average of the most extreme temperatures in each month of the 30-year normals period. The second most extreme temperature is based on the average of the second most extreme day of each month, and so forth. Staff's calculation of daily normal temperatures is not the same as NOAA's calculation of smoothed daily normal temperatures because Staff calculated its normal daily temperatures based on the rankings of the actual temperatures of the test year, and the test year temperatures do not follow smooth patterns from day to day.[101] More details of a ranking method for normal weather are explained in a peer-reviewed publication.[102] Using these normal daily temperatures, Staff calculated normal MDT for each day of the test year. Staff then used this information for weather normalization of the test year kWh usage and update period hourly loads.

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ii. Load Requirement at Transmission

Hourly load requirement is the hourly electric supply necessary to meet the energy demands of both the company's customers and the company's own needs. The hourly loads used

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[100] A more detailed description is discussed in Won, S. J., Wang, X. H., & Warren, H. E. (2016). Climate normals and weather normalization for utility regulation. Energy Economics, 54, 405-416.

[101] It is important to note that Staff's calculation of daily weather normal temperatures do not assign a temperature to a specific calendar date; the method assigns a rank to a normal temperature which is matched to the rank of the actual temperature for a given period.

[102] Won, S. J., Wang, X. H., & Warren, H. E. (2016). Climate normals and weather normalization for utility regulation. Energy Economics, 54, 405-416.

in the analysis of the update period May 2020, through April 2021, were obtained from Ameren Missouri's data provided in accordance with 20 CSR 4240-3.190 (1)(C).

Due to the high saturation of air conditioning, and the presence of significant electric space heating in Ameren Missouri's electric service territory, the magnitude and shape of Ameren Missouri's load requirement are directly related to daily temperatures. The actual daily temperatures for the update period differed from normal conditions. Therefore, to reflect normal weather, daily peak and average load requirement are adjusted independently, but using the same method.

Independent adjustments are necessary because average loads and peak loads respond differently to weather. Daily average load is calculated as the daily energy divided by twenty-four hours and the daily peak is the maximum hourly load for the day. Separate regression models estimate both a base component, which is allowed to fluctuate across time, and a weather sensitive component, which measures the response to daily fluctuations in weather for daily average loads and peak loads. The regression parameters, along with the difference between normal and actual cooling and heating measures, are used to calculate weather adjustments to both the average and peak loads for each day. The adjustments for each day are added respectively to the actual average and peak loads for each day. Staff witness Michael L. Stahlman provided actual and normal daily temperatures used in this analysis.

The starting point for allocating both the weather-normalized daily peak and the weather-normalized average loads to the hours is the actual hourly loads. A unitized load curve is calculated for each day as a function of the actual peak and average loads for that day. The corresponding weather-normalized daily peak and average loads, along with the unitized load curves, are used to calculate weather-normalized hourly loads. This process includes many checks and balances, which are included in the spreadsheets that are used. In addition, the analyst is required to examine the data at several points in the process. For more information, the process is described in greater detail in the document "Weather Normalization of Electric Loads, Part A: Hourly Net System Loads".[103]

[103] "Weather Normalization of Electric Loads, Part A: Hourly Net System Loads" (November 28, 1990), written by Dr. Michael Proctor, Manager of the Economic Analysis Department.

Once Staff's normalized, annualized test year usage for Ameren Missouri's retail customer classes is completed, weather-normalized wholesale usage is added. Then, the non-LTS class annual usage was increased by the average annual loss factor supplied by Staff witness Alan J. Bax. The LTS class' annualized usage was added to the non-LTS annual usage to produce an annual sum of the hourly load requirement that equals the adjusted test year usage and is consistent with Staff's normalized revenues.

A factor was applied to each hour of the weather-normalized loads to produce an annual sum of the hourly load requirement that equals the adjusted test year usage, plus losses, and is consistent with normalized revenues. Once completed, the test-year hourly normalized system loads were given to Staff witness Shawn E. Lange, PE to be used in developing the test year fuel and purchased-power expense.

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iii. COVID-19 Usage Normalization

Staff included an additional variable in the weather normalization regression analysis to estimate the impact of COVID-19 on usage. The variables were developed using Google mobility data for the state of Missouri. Google monitored the locations of cell phones and provided an estimate of how much time people spent at various locations compared to a base of February 14, 2020. This data was made available to assist public health officials in making policies concerning COVID-19.[104]

The categories provided are the change in time spent at retail/recreation, grocery/pharmacies, parks, in transit, at work, and at home. Staff included the change in time spent at home in the residential weather normalization regression analysis and the change in time spent at work in the SGS, LGS, SPS, and LPS weather normalization regression analyses to estimate the impact of COVID-19 on those customer classes. The variable was forced to equal 1 prior to March 15, 2020 since the changes in activity prior to that date were largely unrelated to the virus. The variable was smoothed by using the average of the prior three days (residential) or seven days (work) to account for weekends and other fluctuations. The resulting regression

[104] COVID-19 Community Mobility Reports. (2021) https://www.google.com/covid19/mobility/ (8/11/2021).