

Exhibit No.:
Issue(s): Billing Units
Witness: Nicholas Bowden, PhD
Type of Exhibit: Direct Testimony
Sponsoring Party: Union Electric Company
File No.: ER-2021-0240
Date Testimony Prepared: March 31, 2021

MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. ER-2021-0240

DIRECT TESTIMONY

OF

NICHOLAS BOWDEN, PhD

ON

BEHALF OF

UNION ELECTRIC COMPANY

D/B/A AMEREN MISSOURI

**St. Louis, Missouri
March, 2021**

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I. INTRODUCTION

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Q. Please state your name and business address.

A. Nicholas Bowden, Union Electric Company d/b/a Ameren Missouri ("Ameren Missouri" or "Company"), One Ameren Plaza, 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. What is your position with Ameren Missouri?

A. I am employed by Ameren Missouri as a Regulatory Rate Specialist.

Q. Please describe your educational background and employment experience.

A. I earned a Bachelor of Science in Economics from Bradley University in 2006 and a Masters of Science in Electricity, Natural Gas, and Telecommunications Economics from Illinois State University in 2008. I was employed as an economic analyst with the Illinois Commerce Commission's Federal Energy Program ("ICC") from 2008 until 2012. My work at the ICC primarily revolved around interventions in Federal Energy Regulatory Commission dockets, but also included support for state jurisdictional policy and regulation. I was employed as a lecturer in the Department of Economics and a research associate with the Institute for Regulatory Policy Studies ("IRPS") at Illinois State University between 2011 and 2014. My work with the IRPS centered on the development of a national database of utility rates for the US Department of Energy. I joined Ameren

1 Missouri in August of 2020 as a regulatory rate specialist in the Rates and Analysis. On
2 December 18, 2020, I completed the requirements for a PhD in Energy Systems from the
3 University of California, Davis, and the degree was awarded on March 19, 2021. My
4 primary fields of study were economic theory and econometrics, and my research focused
5 on changes in the technical and economic structure of the electric utility industry.

6 II. PURPOSE OF TESTIMONY

7 **Q. What is the purpose of your direct testimony?**

8 A. The purpose of my direct testimony is to:

- 9 1. Discuss the process used to develop normalized test year billing units and
10 normalized revenues at current rates;
- 11 2. Describe elements of the new, proposed Community Solar Program;
- 12 3. Discuss the analysis of Rider EDI realized rates; and
- 13 4. Address other miscellaneous tariff revisions.

14 **Q. Are you sponsoring any schedules for presentation to the Commission**
15 **in this proceeding?**

16 A. Yes, I am sponsoring four Schedules.

17 Schedule NSB-D1 details the normalized billing units used to determine the
18 normalized retail revenues and develop rates.

19 Schedule NSB-D2 contains the proposed tariff sheets for the new Community Solar
20 Program.

21 Schedule NSB-D3 provides the results of the Rider EDI realized rate analysis
22 (Confidential & Public).

1 Schedule NSB-D4 contains the exemplary tariff sheet for the Community Solar
2 Pilot Program's updated Total Facilities Charge.

3 **III. DEVELOPMENT OF NORMALIZED BILLING UNITS**

4 **Q. Did you conduct the billing unit analysis for this case?**

5 A. Yes, I conducted the billing unit analysis for this case.

6 **Q. What period of time does the billing unit analysis cover?**

7 A. The billing unit analysis was conducted using the twelve months ending
8 December 31, 2020 as the period of study, the proposed test year for this case.

9 **Q. Please explain what is meant by the term "billing unit."**

10 A. A billing unit is a measurable quantity which drives electric power system
11 cost and can be used in conjunction with filed rates to determine customer bills. Billing
12 units include customers (customer count), electrical energy consumption (kilowatt-hours
13 or kWh), power demand (kilowatts or kW), and reactive power demand (kilovolt-ampere
14 reactive or kVar). The billing units used to bill a customer depend on a customer's rate
15 class, but virtually all customers' bills are determined by more than one billing unit. Billing
16 units are typically normalized when rates are set.

17 **Q. Why are billing units normalized?**

18 A. Billing units are normalized for two related reasons. First, billing units are
19 normalized in order to calculate the normalized revenue, the revenue the Company would
20 expect to earn under normal conditions at current rates. Second, normalized billing units
21 are used to develop the proposed rates that will allow the company to earn its revenue
22 requirement under normal conditions.

1 **Q. What is the result of the billing unit analysis?**

2 A. The billing unit analysis results in the normalized test year billing units, and
3 when the current rates are applied, provides the Company's normalized revenue. The
4 normalized test year billing units are detailed in Schedule NSB-D1. The Company's
5 normalized revenue in this case is \$2,501,995,147. The Company's actual revenues, total
6 revenue adjustments, and normalized revenues are shown by customer class in Table 1.

7 **Table 1. Normalized Revenue By Class**

Customer Class	Actual Revenues	Total Adjustments	Normalized Revenue
1M	1,272,233,572	809,604	1,273,043,176
2M	269,741,584	4,505,924	274,247,507
3M	504,230,639	2,918,500	507,149,139
4M	220,166,171	249,937	220,416,108
11M	188,674,769	-98,908	188,575,861
Lighting	38,444,035	44,355	38,488,390
MSD	74,966	-476	74,966
*Total	2,493,565,737	8,399,889	2,501,995,147
*Total may differ from sum of rows due to rounding.			

8 The difference between the Company's total revenue requirement, as calculated by
9 Company witness Mitchell Lansford, and normalized revenue represents the difference
10 between the Company's cost of service and the revenue that the Company would expect to
11 earn in a normal year at current rates. The normalized billing units are used in conjunction
12 with this difference to determine proposed rates that fully cover the Company's cost under
13 normal conditions.

14 **Q. What adjustments is the Company making to normalize billing units?**

15 A. The Company is making six adjustments to normalize billing units and
16 consequently revenues, and also making three adjustments that do not impact billing units
17 but result in direct adjustments to revenue. The six billing unit adjustments are as follows:

- 1 1. A weather normalization adjustment;
- 2 2. A days adjustment;
- 3 3. An energy efficiency adjustment;
- 4 4. A solar adjustment;
- 5 5. A growth adjustment; and
- 6 6. An initial pandemic shock adjustment.

7 The three direct revenue adjustments are as follows:

- 8 1. A rate annualization adjustment;
- 9 2. An economic development incentive adjustment; and
- 10 3. A community solar adjustment.

11 The revenue value of each billing unit adjustment is shown in Table 2 by customer class.

12 **Table 2. Billing Unit Revenue Adjustments**

Customer Class	Weather Adjustment	Days Adjustment	Energy Efficiency Adjustment	Solar Adjustment	Growth Adjustment	Pandemic Shock Adjustment
1M	6,296,623	33,505	-10,238,668	-372,621	7,546,475	0
2M	1,348,164	-683,092	-1,925,718	-66,757	1,886,645	3,734,472
3M	1,926,984	-771,308	-3,771,934	-94,248	-29,144	5,734,443
4M	242,606	-738,939	-1,114,873	0	-96,169	2,057,648
11M	47,458	-988,322	-91,061	-118	-517,970	1,304,840
Lighting	0	0	0	0	44,355	0
MSD	0	0	0	0	0	0
*Total	9,861,835	-3,148,155	-17,142,255	-533,743	8,834,193	12,831,403

*Total may differ from sum of rows due to rounding.

13 The value of each non-billing unit revenue adjustment are shown in Table 3 by customer
14 class.

1

Table 3. Non-Billing Unit Revenue Adjustments

Customer Class	Annualization Adjustment	EDI Adjustment	Community Solar Adjustment
1M	-2,549,766	0	94,056
2M	212,209	0	0
3M	18,166	-94,460	0
4M	-15,778	-84,558	0
11M	146,263	0	0
Lighting	0	0	0
MSD	0	0	0
*Total	-2,188,905	-179,018	94,056
*Total may differ from sum of rows due to rounding.			

2

Q. What is the starting point for the process of normalizing billing units?

3

A. The process of normalizing billing units starts with the actual metered and billed test year billing units. The Company's billing system writes newly generated customer meter and billing data to a database for future data retrieval and analysis. Queries written and sent to the database can return customer billing data at varying levels of granularity. In the first step of the billing unit analysis, we retrieve the actual monthly billing units as customer class level aggregates. We exclusively use these monthly class level aggregates for the residential, small general service, large general service, and small primary service classes billing unit analysis. The query which produces the class level aggregates listed above also includes the aggregates for the large primary service and lighting service classes, but those aggregates are supplemented by large primary service account and lighting fixture level data. This data is the starting point for the process of normalizing billing units and calculating normalized revenues at current rates.

15

Q. How are the actual aggregate monthly billing units used in your analysis?

17

A. The actual aggregate monthly billing units are used in conjunction with historical rates that were applicable during the test year to calculate the actual revenues

18

1 earned in the test year. Separate calculations are made for base rate revenue and rider
2 revenue. Riders for the test year include the fuel adjustment clause ("FAC"), energy
3 efficiency incentive charge, and the renewable energy standard revenue adjustment
4 mechanism. The calculated base rate revenue is compared to the Company's book revenue
5 minus the calculated rider revenue. In ideal circumstances, the difference between the
6 Company's book revenue minus calculated rider revenue would equal the base rate revenue.
7 However, corrections and rebillings do occur and can change revenues in a way not fully
8 reflected in changes to billing units and vice versa. Nonetheless, the differences we observe
9 between calculated and booked base revenues are minimal, ranging from 0.001% in the
10 small general service class to 0.05% in the large general service class. A portion of these
11 differences appears also to originate from the challenge of prorating rider revenues
12 associated with FAC changes occurring after the first of the month.

13 **Q. What is the purpose of conducting the large primary service billing unit**
14 **analysis at the customer account level?**

15 A. We conduct the large primary service billing unit analysis at the customer
16 account level, because the number of customers is small enough to make the account level
17 analysis feasible. The customers are also large, in terms of billing units, and changes in a
18 single customer's load can have a non-negligible impact on the class aggregate and system
19 load. Customer level data allows us to identify customer specific trends and anomalies,
20 research their causes, and make customer-specific adjustments when necessary. For
21 instance, in the 2020 test year, customer level data shows one specific large primary service
22 customer whose load drops to zero in month five of the test year and remains at zero
23 thereafter. A follow-up investigation reveals that this manufacturing customer did not

1 temporarily shut down due to the public health crisis, but rather closed permanently due to
2 competitive pressures in the market. The four months of this customer's kWh, kW, and
3 kVar were removed from the test year to annualize the impact of that customer's closure,
4 since the customer is not expected to return to service, and therefore, will not contribute
5 revenues when rates from this case take effect.

6 **Q. What is the purpose of conducting the lighting service billing unit**
7 **analysis at the lighting fixture level?**

8 A. Unlike all other retail electric rates, retail rates for unmetered lighting
9 service are defined on a dollar per fixture per month basis, and more than 90 percent of the
10 Company's lighting service revenue comes from unmetered customers. While we can
11 observe customer counts, implied kWh (rated watts \times lighting hours \times 1/1000), and book
12 revenues at the class level using aggregate monthly data, we cannot calculate base revenue
13 using these monthly aggregates. We cannot make this calculation, because base revenue is
14 determined by the monthly rate per fixture and the fixture count. Technically, fixture counts
15 are the billing units for unmetered lighting service. Therefore, we retrieve monthly fixture
16 counts in a separate query in order to conduct the lighting service billing unit analysis. The
17 fixture level data also allows us to embed the LED conversion in our pro-forma growth
18 annualization adjustment. Component/fixture counts are projected out to September 2021
19 using the fixture specific count trends during the test year. Those trends capture absolute
20 growth in total fixture counts and also the conversion of historic fixture types to LED
21 fixtures. Generally speaking, we observe declines in the historic fixture types and offsetting
22 increases in LED fixture types.

1 **A. Billing Unit Revenue Adjustments**

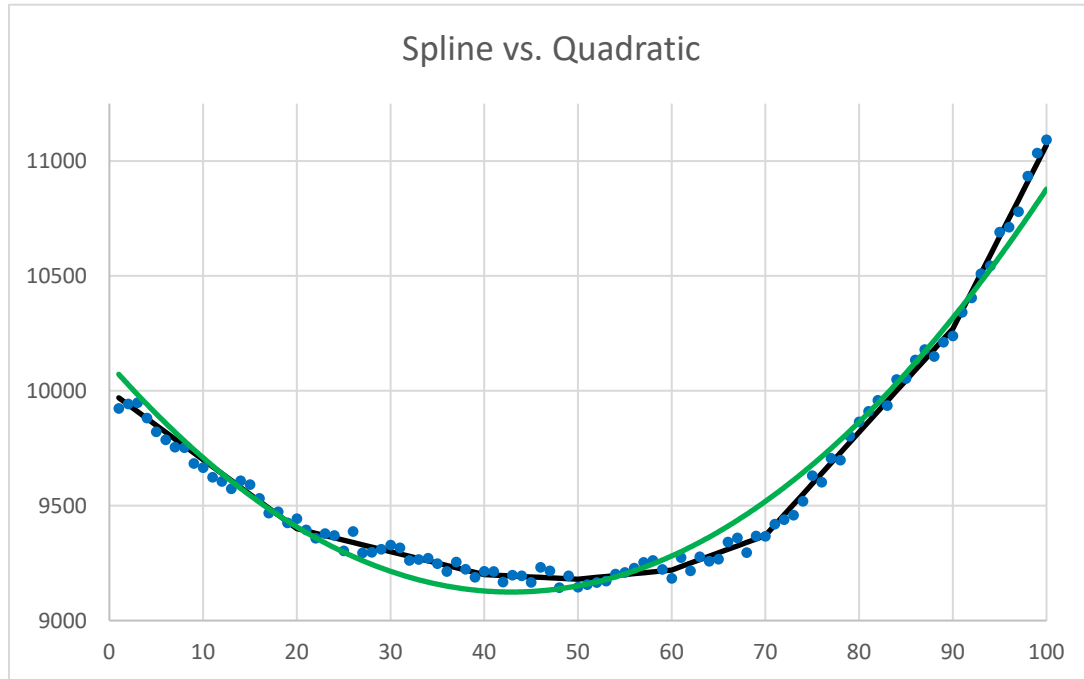
2 **Q. How and why was the weather adjustment made?**

3 A. The weather adjustment, or weather normalization, is made to remove the
4 impact that test year specific weather conditions have on revenues through weather's
5 impact on billing units. The weather normalized billing units are a statistical estimate of
6 the billing units that would have occurred during the test year under the assumption of
7 'normal' weather conditions. The impact of test year weather on billing units and revenue
8 and the resulting adjustment result when weather in the test year deviates from normal
9 weather. It is possible for test year weather to be equivalent to normal weather, but given
10 the degree of variation in weather from year to year, the possibility is highly improbable.
11 The direction and magnitude of the billing unit and revenue impact and resulting
12 adjustment are a function of the direction and magnitude of the monthly deviations between
13 test year weather and normal weather, and the way different customer class loads respond
14 to variation in weather at different times of the year. The weather adjustments are made
15 using customer class and month specific weather adjustment ratios. The class and month
16 specific weather adjustment ratios are multiplied by actual kWh billing units for that class
17 and month to produce weather adjusted kWh billing units. The ratios are defined as the
18 ratio of normal kWh to actual billed kWh for each class in each month. Actual billed kWh
19 are observed and normal kWh are estimated for each class using statistical models of the
20 relationship between weather and billing units, and then that relationship is used to make
21 adjustments to observed kWh based on the difference between actual and normal weather
22 conditions. Our class specific statistical models of the relationship between weather and
23 kWh usage are estimated by ordinary least squares using day-of-week and month fixed

1 effects and a temperature spline. The day-of-week and month fixed effects capture the
2 predictable level differences in kWh usage that exist along these dimensions of time, and
3 that are not related to variation in daily temperature. For instance, there is a predictable
4 difference between the level of kWh used on Saturdays and Sundays and the level of kWh
5 used during the weekdays at an office building that is not related to the variation in daily
6 temperature. Monthly fixed effects capture predictable variations in the level of kWh usage
7 associated with environmental and behavior factors that are seasonal, but independent of
8 variation in daily temperature. For instance, the level of kWh used during winter months
9 is greater than spring or summer due to the increased hours of lighting. In addition to these
10 level effects, we observe a predictable non-linear relationship between temperature and
11 kWh usage. The relationship might generally be characterized as parabolic with the
12 parabola opening upward, i.e. greater kWh usage at higher and lower temperatures and
13 lower kWh usage in the middle of the range of temperatures, but the relationship is not
14 symmetric around the minimum, so it is not technically parabolic. A temperature spline is
15 our preferred modeling choice, because it allows us to capture the non-linear nature of the
16 relationship between temperature and kWh usage using a piecewise linear approximation
17 rather than quadratic approximation that would force symmetry on either side of the
18 parabola's minimum. Figure 1 provides a stylistic illustration of the superiority of modeling
19 a relationship with a piecewise linear spline relative to a quadratic when the data might
20 generally be described as parabolic, but is, in fact, not symmetric around the minimum.

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Figure 1. Regression Spline



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In Figure 1, the black line is a piecewise linear spline approximation of the blue

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points, which represent the observed relationship between the **X** and **Y** variables

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(temperature and kWh usage). The green line in Figure 1 is a quadratic approximation of

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the data. It is clear in this illustration that the quadratic function systematically

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underestimates **Y** along some portions of the range of **X** and overestimates **Y** along other

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portions of **X**. On the other hand, the piecewise linear spline does not systematically

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underestimate or overestimate **Y** at any point along **X**. The class specific ordinary least

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squares models are estimated using two years (2019 and 2020) of daily temperature values

11

and kWh usage and produce parameters that describe the relationship between temperature

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and kWh usage, holding the day-of-week and month constant. These parameters values can

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then be used to estimate the kWh usage that would have occurred under normal weather

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conditions. Effectively, we hold kWh usage associated with each specific month and day-

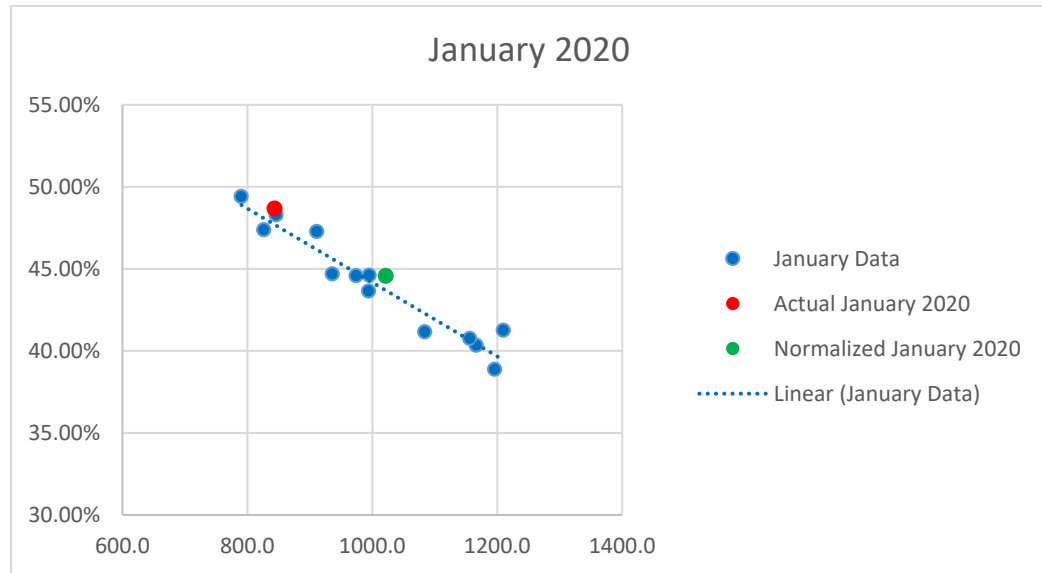
15

of-week combination level, and replace the observed quantity of kWh used associated with

1 the test year temperature with the quantity of kWh associated with normal weather. We use
2 a thirty year average (1988 to 2018) to estimate normal daily weather conditions. In
3 addition to the normalizing each individual kWh billing unit using customer class and
4 month specific weather adjustment ratios, the proportion of kWh consumed within block 1
5 to the kWh consumed within block 2 of the residential and small general service classes
6 are normalized for each winter month. Historic data on the proportion of kWh consumed
7 in block 1 to kWh consumed in block 2 are regressed on historic temperature variables by
8 month to develop a month specific relationship between the proportion of kWh consumed
9 in each block and temperature. The month specific relationship between the proportion of
10 kWh consumed within each block and the difference between the proposed test year and
11 normal monthly temperature are then used to normalize the proportion observed in each
12 winter month of the proposed test year. The month specific normalized proportion is then
13 used to normalize the actual kWh within each block. Figure 2 illustrates the process of
14 normalizing the proportion of kWh that are consumed within each block. The proportion
15 along the vertical axis in Figure 2 measures the percent of the total kWh consumed in block
16 1 and the horizontal axis measures heating degree days, an aggregate measure of weather
17 in the month. The blue points represent historic data and the red point represents the
18 proposed test year observation. The slope of the dotted blue line represents the estimate of
19 the historic relationship between temperature (heating degree days) and the proportion of
20 kWh consumed within block 1 in January. The green point represents the weather
21 normalized proportion of kWh consumed with block 1 during January of the test year. The
22 horizontal position of the green point is the normal temperature. The process of

1 normalizing the proportion of kWh which are consumed within block 1 moves the
2 proportion along the line (but not exactly on to it) until it reaches the normal temperature.

3 **Figure 2. Residential and Small General Service Block Normalization**



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5 **Q. What is the result of the weather adjustment?**

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A. Generally speaking, the weather adjustment increased billing units in the winter months and decreased billing units in the summer months across all classes. Equivalently, billing units were lower than normal in winter months and higher than normal in summer months during the test year. This result could be generally characterized as the result of a warmer than normal weather throughout the test year; greater than normal cooling loads in the summer and lower than normal heating loads in the winter. The competing seasonal adjustments in billing units, increases in winter and decreases in summer, ultimately resulted in weather normalized revenues which were greater than the revenues associated with observed billing units for each customer class. Despite generally higher summer rates, if the ratio of the winter billing unit increase to summer billing unit decrease is greater than the ratio of average summer to average winter rates, then the

1 increase in revenues would be expected. The weather adjustment results in a total increase
2 in revenue of \$9,861,835 as shown in Table 2.

3 **Q. How and why was the days adjustment made?**

4 A. The Company's observed billing units for a given billing month do not
5 necessarily represent kWh and kW that occurred exclusively during the similarly named
6 calendar month. In fact, it is rare that a customer's billing month corresponds precisely to
7 the calendar month with the same name. The lack of correspondence between billing month
8 and calendar month is a result of the staggered reading of groups of meters, i.e. different
9 customers have different billing cycles. Therefore, customers whose billing cycle straddles
10 two calendar months will have billing units assigned to a single billing month by the
11 Company's billing system, but truly have billing units which occurred in two different
12 calendar months. The lack of correspondence between billing months and calendar months
13 can also result in customers whose billing year is more or less than a 365-day calendar
14 year. Therefore, these customers' billing units need to be decreased or increased to reflect
15 a normal 365-day year. The days adjustment corrects both of these deviations by shifting
16 billing units across adjacent months and constraining total billing units to the 365 day
17 calendar year. The total days adjustment is not influenced by the lack of correspondence
18 between months on the interior of the test year, but is rather a function of the deviations
19 that occur during the boundary months of the test year, January and December. However,
20 the seasonal element of the days adjustment is influenced by months on the interior of the
21 test year, specifically, the transition months between the summer and winter rate periods.
22 The days adjustment is calculated for the totality of the test year, and separately for the
23 summer and winter rate periods. The sum of the seasonal days adjustments is equal to the

1 total days adjustment. The seasonal days adjustments are each a quantity of kWh, and each
2 quantity is allocated to each kWh billing unit in each month based on the ratio of the
3 monthly weather normalized kWh for each specific billing unit (block 1, block 2, on-peak,
4 off-peak, etc.) to the total weather normalized kWh associated with the appropriate season.
5 The seasonal dimension of the days adjustment is relevant in this case, because the
6 Company's billing processes, as reflected in its tariffs, were updated to feature proration of
7 seasonal rates as a result of the settlement of the Company's last electric rate case (File No.
8 ER-2019-0335). The seasonal billing proration policy makes summer rates effective for
9 the calendar days of June 1 through September 30, rather than effective for the summer
10 months per the billing periods and meter read dates defined by the Company's meter
11 reading schedule. This seasonal days adjustment ensures that usage is normalized
12 consistent with this new definition of seasonal rate application, and that the billing units
13 reflect summer usage that is consistent with current billing practices.

14 **Q. What is the result of the days adjustment?**

15 A. In the proposed test year, the seasonal days adjustment decreases winter
16 billing units and increases summer billing units across all customer classes. It does not
17 appear that this pattern is systematic, but rather a function of the realized patterns in the
18 seasonal boundary months during this specific test year. Nonetheless, the result is a
19 decrease in winter revenues and an increase in summer revenues for each class. In all but
20 one class, residential, the decrease in winter revenues is larger in absolute terms than the
21 summer increase, and in aggregate, total revenue decreases as a result of the days
22 adjustment. For the residential class, the opposing revenue effects are almost identical and

1 result in a very small increase in revenue. In total, the days adjustment results in a
2 \$3,148,155 decrease in total Company revenue as shown in Table 2.

3 **Q. How and why was the energy efficiency adjustment made?**

4 A. The energy efficiency adjustment was made to annualize the impact of
5 energy efficiency measures implemented throughout the test year. The energy efficiency
6 adjustment is explicitly required by the terms of the Company's Demand Side Investment
7 Mechanism that was approved by the Commission pursuant to the Missouri Energy
8 Efficiency Investment Act ("MEEIA"), and compensates the Company for the decrease in
9 billing units and associated revenue that result from energy efficiency measures
10 implemented during the test year. The energy efficiency annualization adjustment is
11 calculated using the incremental energy savings of energy efficiency by measure type that
12 was installed during each month of the test year. The incremental energy efficiency
13 measures installed in each month are used along with average kWh savings profiles by
14 measure type to estimate the number of kWh saved during the remaining months of the test
15 year, inclusive of the month of installation. A half month convention is used to estimate
16 the savings in the month of installation. The half month convention is an assumption that
17 all incremental energy efficiency capacity was installed at the half way point between the
18 beginning and end of month and is mathematically equivalent to assuming that the
19 investments were made uniformly across the month. This estimate reflects actual test year
20 energy efficiency savings that are already embedded in the test year kWh billing unit data,
21 because the estimate reflects the savings that occurred and were not metered or billed
22 during the test year. Next, the level of savings that would have been realized during the test
23 year, assuming all measures were installed on January 1 of the test year, is estimated for

1 each month of the test year. This second estimate reflects the kWh billing units that the
2 Company will not meter or bill going forward as a result of the energy efficiency measures
3 installed in the test year, the annual energy efficiency savings. The positive monthly
4 difference (annual – actual test year savings) between these two estimates is subtracted
5 from the actual billing units so that normalized billing units reflect the total annual
6 reductions in billing units that resulted from the energy efficiency measures installed in the
7 test year. This monthly difference is the primary component of the energy efficiency
8 annualization adjustment, but the adjustment also includes another, relatively minor
9 component, the Demand Response Event Net Energy ("DRENE") component. DRENE
10 kWh result when demand response events are called by the Company, and participating
11 customers reduce kWh consumption in order to provide system benefits. The kWh
12 reductions that result from these events are reflected in billing units, but are not permanent
13 energy savings like those that result from investments in energy efficiency measures.
14 Therefore, DRENE kWh are added back to the test year billing units to reflect normal
15 conditions, but are added by reducing the annualized energy efficiency reductions as
16 follows:

17 Energy Efficiency Adjustment = Annual Energy Efficiency Savings – Test Year
18 Energy Efficiency Savings – DRENE kWh

19 **Q. What is the result of the energy efficiency adjustment?**

20 A. The energy efficiency adjustment decreases kWh billing units for every
21 class, because the energy efficiency component unambiguously reduced billing units and
22 is large relative to the DRENE component, which is zero in many months for most
23 customer classes and always zero for the residential class. In total, the energy efficiency

1 adjustment reduced kWh billing units by 228,109,938 kWh. The energy efficiency
2 adjustment decreases the Company's revenue by \$17,142,255 as shown in Table 2.

3 **Q. How and why was the solar adjustment made?**

4 A. The solar adjustment was made to annualize the impact of behind-the-meter
5 solar installations made throughout the test year by the Company's customers, the majority
6 of which were incentivized by the Company pursuant to Section 393.1670, RSMo. The
7 solar adjustment reflects the decrease in billing units and associated revenue that occur as
8 a result of such customer solar generation installations during the test year. The solar
9 adjustment is calculated using the incremental behind-the-meter capacity installed during
10 each month of the test year. The number of kWh generated by each solar installation, given
11 their installation month and installed capacity, is estimated for each month of the test year.
12 This estimate reflects actual test year behind-the-meter generation already embedded in the
13 test year kWh billing unit data, because the estimate reflects the generation that occurred
14 and was not metered or billed during the test year. Next, the number of kWh that would
15 have been generated during the test year assuming all capacity was installed on January 1
16 of the test year is estimated for each month of the test year. The monthly difference between
17 these two estimates is the preliminary estimate of the solar adjustment. This preliminary
18 estimate of the solar adjustment is then further adjusted to reflect the fact that not all
19 behind-the-meter solar generation will net against retail load, but rather some number of
20 the kWh generated will be sold to the Company at its avoided cost rate under the Electric
21 Power Purchases from Qualifying Net Metering Units tariff (Sheet No. 171). In order to
22 reflect these sales in the solar adjustment, we estimate the probability that any kWh of
23 behind-the-meter solar generation will be sold to the Company at avoided cost. We

1 estimate this probability monthly using the ratio of total behind-the-meter generation sold
2 at avoided cost to the total behind-the-meter generation. The preliminary adjustment is
3 multiplied by one minus this probability to determine the final solar adjustment.

4 **Q. What is the result of the solar adjustment?**

5 A. The solar adjustment unambiguously decreases kWh billing units for
6 customer classes which have non-zero behind-the-meter solar capacity installed during the
7 test year. The total solar adjustment for all classes of customers is 6,773,954 kWh for the
8 test year, and decreases the Company's revenue by \$533,743.

9 **Q. How and why was the growth adjustment made?**

10 A. The growth adjustment was made to adjust billing units to the level we
11 expect to observe at the time of the regulatory true-up, September 2021, in order to
12 minimize the change in normalized revenues that will occur upon the true-up. The growth
13 adjustment is made according to the following procedure. First, a class specific customer
14 count forecast is made for September 2021. Second, the difference between the forecasted
15 customer count value and the test year customer count is calculated for each month. Third,
16 the difference, or change, in customer count in each class is multiplied by the class average
17 billing unit values, and added to the actual test year billing unit values. The extraordinary
18 conditions which occurred during the test year resulted in the selection of customer count
19 forecast models that are simpler than traditional econometric forecast models. Traditional
20 forecast models incorporate macro-economic variables whose relationships with utility
21 customer counts are likely to have changed in a structural way and may therefore produce
22 biased results. The forecast method chosen for the each class of customer is shown in Table
23 4.

1

Table 4. Growth Forecast Methodology by Class

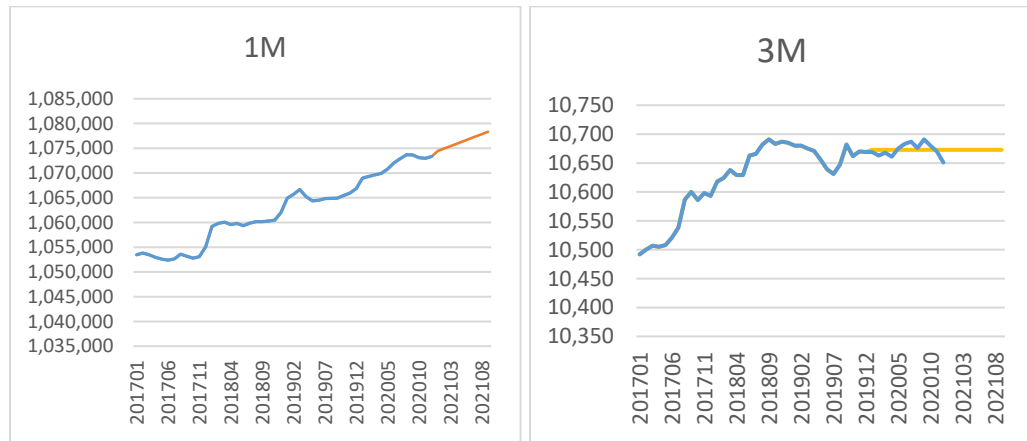
Customer Class	Method	Data
1M	Linear Trend	Monthly 2017 - 2020
2M	Linear Trend	Monthly 2017 - 2020
3M	2020 Average	Monthly 2020
4M	2020 Average	Monthly 2020
11M	No Forecast	NA
Lighting	Trend	Monthly 2020
MSD	No Forecast	NA

2

The class specific forecast models were chosen based on graphical inspection of monthly customer count data between 2017 and 2020, and the evaluation of several simple forecasting methods. Graphical representations of residential and large general service forecasts are included in Figure 3 for illustration of the choices.

6

Figure 3. Customer Count Forecasts



7

8

Q. What is the result of the growth adjustment?

9

A. The growth adjustment resulted in reasonable increases in residential and small general service lighting revenues and reasonable decreases in large general service and small primary service revenues. The growth adjustment for lighting results in an increase to normal revenue, is based on fixture rather than customer counts, and implicitly includes the Company's LED conversion program. There is no customer count forecast

13

1 made for the large primary service class, but a growth adjustment is made to account for
2 the single customer who left the customer class, which produces a decrease in revenue. The
3 supplementary components of the lighting and large primary service growth adjustments
4 were discussed in greater detail above in the section entitled Development of Normalized
5 Billing Units above. In total, the growth adjustment increases the Company's revenue by
6 \$8,834,193.

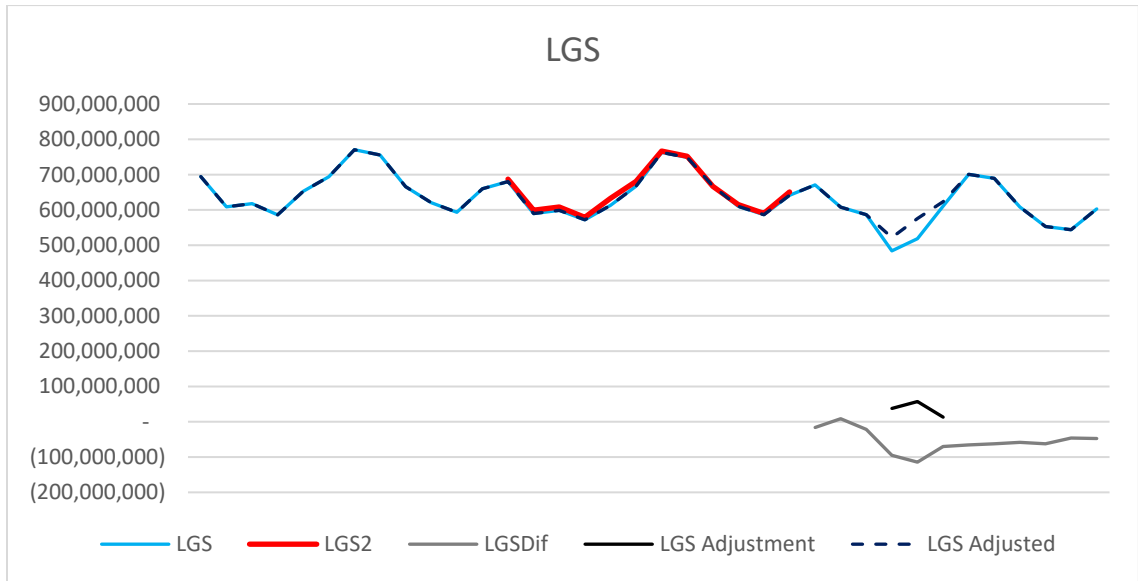
7 **Q. How and why was the initial pandemic shock adjustment made?**

8 A. The initial pandemic shock adjustment was made because of the initial
9 economic shock of the pandemic resulted in an extreme decrease in load, i.e. billing units,
10 that was transient relative to the decrease in load that is persistent during the following
11 months of the test year. The initial pandemic shock adjustment serves to adjust billing units
12 in the initial three months of the pandemic, because those initial three months, April, May
13 and June, exhibit a greater decrease than the average and relatively constant decrease in
14 load observed in the following six months. Decreases here are in terms of the average
15 weather adjusted load in the preceding two years. The initial pandemic shock adjustment
16 is calculated using the three years of monthly weather normalized kWh data between 2018
17 and 2020. The concept and calculation of the initial pandemic shock adjustment is
18 illustrated in Figure 4. The three years of weather normalized data are shown for the large
19 general service class in Figure 4 as the solid light blue line. The monthly average of the
20 two complete years preceding the year of the pandemic is calculated, and is superimposed
21 on the year 2019 and shown as the solid red line in Figure 4. It is clear in this example, and
22 is similarly clear in the case of other classes where the adjustment is made, that the two-
23 year average fits closely to the year 2019, and therefore, necessarily fits closely to 2018.

1 This similarity between the two years makes it reasonable to assume that the monthly 2020
2 kWh would have been similar to either year independently and the two-year average,
3 absent the pandemic. Next, we subtract the two-year average from the weather normalized
4 2020 data by month. The result of this subtraction is shown as the solid gray line in Figure
5 4. The figure clearly shows that the difference is almost exactly zero in the three earliest
6 month of 2020, prior to the economic shock of the outbreak of the pandemic. In April of
7 2020, there is a sharp decline in kWh usage when the initial economic shock of the
8 pandemic hits the economy. This shock has an even larger effect on kWh in May and
9 sharply softens in June. The initial transient shock evidenced by the sharp decrease and
10 rebound in the difference between 2020 kWh usage and the preceding two-year average
11 appears complete by July of 2020. The monthly kWh usage remains less the two-year
12 average during the remaining six months of 2020, but the difference is persistent. The
13 initial pandemic shock adjustment does not adjust kWh usage in July through December
14 of 2020, but rather uses that persistent difference between the two-year average and the
15 July through December 2020 average to adjust the initial three months of the pandemic,
16 April through June. This calculation is made by first calculating the average of the monthly
17 difference between July through December of 2020 and the monthly two-year average.
18 This average monthly difference is then subtracted from each of the monthly differences
19 between April through June of 2020 and the monthly two-year average and multiplied by
20 negative one. The result of this calculation is shown as the solid black line in Figure 3. If
21 these values (solid black line) were added to the difference between the monthly 2020
22 values and the monthly two-year average (solid grey line), the result would be a relatively
23 constant negative difference between April and December of 2020, i.e. the initial sharp

1 decrease in the solid gray line would be eliminated. Similarly, but more importantly, the
2 adjustment values (solid black line) are added to the actual weather normalized 2020 values
3 (solid light blue line) to determine the initial pandemic shock adjusted kWh billing unit
4 values, represented by the dotted dark blue line in Figure 3.

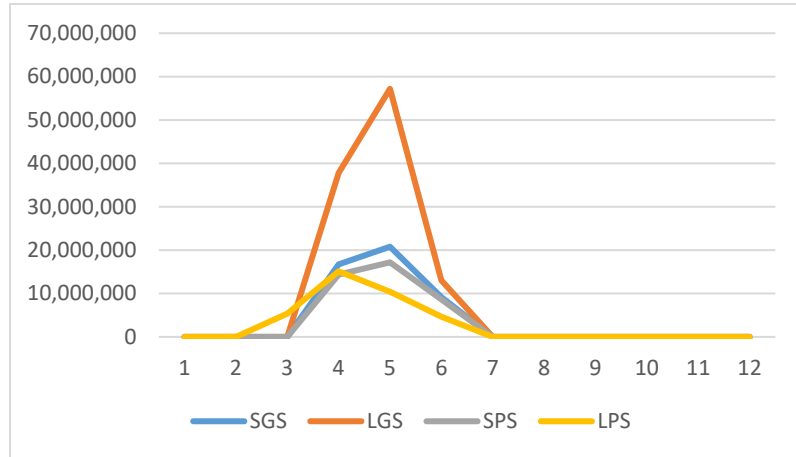
5 **Figure 4: Initial Pandemic Shock Adjustment: LGS kWh**



6
7 The revenue values for the initial pandemic shock adjustment for all classes of
8 customers for which the adjustment was made are shown in Figure 5. The adjustment was
9 made for the small general service, large general service, and small primary service rate
10 classes according to the method described above. In the case of large primary service,
11 customer specific adjustments were made based on the observation of zero or near zero
12 kWh loads for two customers that persisted between two and three months. A follow-up
13 investigation revealed that these two customers had reported pandemic related closures that
14 were necessary for the maintenance of employee health. In this instance, both customers
15 are manufacturing facilities with historical monthly kWh load profiles which are nearly
16 constant. Therefore, we simply replaced the monthly kWh billing units in those months

1 where the facility was shut down due to the pandemic with the monthly average kWh for
2 the remaining months.

3 **Figure 5: Initial Pandemic Shock Adjustments**



4
5 It is also worth noting that these adjustments fall within the period in which kWh
6 usage will be updated with 2021 normalized billing unit values, and therefore the initial
7 pandemic adjustment primarily reflects our expectation of those 2021 values and
8 minimizes the variation in the revenue that would otherwise occur between the initial direct
9 filing and the update of billing units as part of the true-up.

10 **Q. What is the result of the initial pandemic shock adjustment?**

11 A. The initial pandemic shock adjustment results in an increase to the kWh
12 billing units for small general service, large general service, small primary service, and
13 large primary service. The initial pandemic shock adjustment results in a total increase of
14 230,494,481 kWh and increases the Company's revenue by \$12,831,403.

15 **B. Non-Billing Unit Revenue Adjustments**

16 **Q. How and why was the rate annualization adjustment made?**

17 A. The rate annualization adjustment was made because rates changed as a
18 result of the Company's last electric general rate case, File No. ER-2019-0335, during the

1 test year. The adjustment was made to quantify the revenue impact of this change in rates
2 so that test year booked revenues could be adjusted to reflect the level of revenues that
3 would have been expected to be recorded had the rates that were implemented on April 1st
4 of the test year been in effect from January 1. This adjustment had no impact on billing
5 units. The adjustment was made by first calculating base revenues at historic rates, and
6 then calculating base revenues as if current rates were in effect for the entire test year. The
7 difference between these two revenues is the annualization adjustment.

8 **Q. What is the result of the annualization adjustment?**

9 A. The result of the annualization adjustment is small changes revenues, but
10 those changes vary in direction across customer classes. A small decrease, or zero change,
11 was initially expected for all customer classes given the result of File No. ER-2019-0335
12 was a small decrease in rates for all customer classes, with the exception of the customer
13 owned lighting class and the Metropolitan Sewer District who both received zero change
14 to their rates. However, the result for a few classes was a small increase in revenue. This
15 counterintuitive result can be explained by the combination of three factors. First, the same
16 percentage decrease was applied to all base energy components of rates, both summer and
17 winter rates, as approved in the stipulation in File No. ER-2019-0335. Second, the tax
18 credit which existed prior to the effective date of current rates was the same in winter and
19 summer months. Given rates are greater in the summer than the winter, the constant tax
20 credit is greater in proportion to the winter rate. Therefore, the removal of the tax credit
21 represents a greater percentage increase in the winter rate relative to the summer rate.
22 Third, the test year only includes winter months with rates that are not current rates. Table
23 5 illustrates the interaction between the first two factors for the small general service class.

1 Table 5 shows that the impact of the rate change inclusive of the effect of the removal of
2 the tax credit is an increase in winter rates. Because there are only winter months in the test
3 year with the pre-April 2020 rates, the result of the annualization adjustments for the SGS
4 class is a small increase in revenue.

5 **Table 5. Rate Annualization Result Factors: SGS**

Billing Unit	Base Rate Pre-4-2020	Tax Credit	Rate Post-4-2020	Base Rate Change	Base Rate Percent Change	Tax Inclusive Change	Tax Inclusive Percent Change
Summer kWh	11.2	0.581	10.43	-0.77	-0.069	-0.189	-0.017
Winter Block 1 kWh	8.36	0.581	7.79	-0.57	-0.068	0.011	0.001
Winter Block 2 kWh	4.82	0.581	4.49	-0.33	-0.068	0.251	0.052

6 The same is not the case for the residential class. Table 6 shows how the tax credit
7 inclusive effect on rates is not an unambiguous increase in winter rates.

8 **Table 6. Rate Annualization Result Factors: Residential**

Billing Unit	Base Rate Pre-4-2020	Tax Credit	Rate Post-4-2020	Base Rate Change	Base Rate Percent Change	Tax Inclusive Change	Tax Inclusive Percent Change
Summer kWh	12.58	0.621	11.81	-0.77	-0.061	-0.149	-0.012
Winter Block 1 kWh	8.76	0.621	8.04	-0.72	-0.082	-0.099	-0.011
Winter Block 2 kWh	6	0.621	5.38	-0.62	-0.103	0.001	0.000

9 In total, the annualization adjustment resulted in a \$2,188,905 decrease in
10 revenues.

11 **Q. How and why was the economic development incentive adjustment**
12 **made?**

13 A. The economic development incentive adjustment was made to account for
14 base rate revenues that were not collected, because of discounts on base rates that were
15 granted under the Company's economic development incentive provisions (Rider EDI at
16 Sheet Nos. 86-86.5). Rider EDI was approved in compliance with Section 393.1640,

1 RSMo. Section 393.1640 allows a customer meeting specific economic development
2 criteria to receive a percentage discount on base rates for a period up to five years. The
3 annual discount may vary between thirty and fifty percent of base rates in any given year,
4 but must be forty percent on average over the five-year period. The value of the economic
5 development incentive discount is calculated as part of each applicable customer's monthly
6 billing process, and therefore, the individual monthly value of the discount for each
7 applicable customer can be retrieved from the billing unit database. The values of the
8 individual monthly discounts are aggregated across customers to determine the total value
9 of base revenues that the Company did not collect as a result of the economic development
10 incentive discounts. That total value is the economic development incentive adjustment.

11 **Q. What is the result of the economic development incentive adjustment?**

12 A. The economic development incentive adjustment decreases the Company's
13 revenue by \$179,018. The reduced level of revenues, \$179,018, is allocated to each of the
14 Company's customer classes through the application of a uniform percentage adjustment
15 to the revenue requirement responsibility of all customer classes as required by Section
16 393.1640 as outlined further by Company witness Michael Harding.

17 **Q. How and why was the community solar adjustment made?**

18 A. The community solar adjustment was made to account for the incremental
19 revenues beyond base rate revenues that were collected by the Company in conjunction
20 with the Community Solar Pilot Program. The Community Solar Pilot Program allows
21 residential and small general service customers to purchase up to 50 percent of their kWh
22 from a solar generation resource built for the Community Solar Pilot Program. Customers
23 who choose to participate and purchase energy from the solar generation resource pay the

1 Community Solar Pilot Program solar energy rate for each kWh of solar energy. Each kWh
2 of solar energy purchased by customers replaces a kWh that the customer would have
3 purchased at their otherwise applicable base rates. Therefore, the average incremental
4 revenue beyond base rate revenue that the Company collected for each kWh of solar energy
5 purchased is equal to the difference between the community solar rate and the average rate
6 of a replaced kWh. The product of the total kWh sold and the difference between the
7 community solar rate and the average rate of a replaced kWh is the total incremental
8 revenue beyond base rates collected by the Company, and is equal to the community solar
9 adjustment.

10 **Q. What is the result of the community solar adjustment?**

11 A. All 1,302 100 kWh blocks of solar were subscribed for all twelve months
12 of the test year, and therefore, the Company sold 1,562,400 kWh of solar energy during
13 the test year. The solar energy rate is equal to 0.1391 \$/kWh and the average rate of a
14 replaced kWh was 0.0789 \$/kWh. Therefore, the community solar adjustment increases
15 the Company's revenue by \$94,056. The specific value of increased revenues associated
16 with the Community Solar Pilot Program, \$94,056, will be distributed to all classes of
17 customers pro rata, and offset revenues that would otherwise be collected in base rates.

18 **IV. NEW COMMUNITY SOLAR PROGRAM**

19 **Q. Please highlight the changes proposed to the Community Solar Pilot**
20 **Program subscription mechanism for the new, non-pilot Community Solar Program?**

21 A. The proposal to move the Company's Community Solar Pilot program to a
22 permanent offering is discussed in more detail in the testimony of Company witness
23 Annemarie Nauert, and the tariff sheets for the new Community Solar Program are attached

1 to my testimony as Schedule NSB-D2. The Community Solar Program proposal includes
2 a change to the subscription mechanism relative to the pilot program. In the pilot program,
3 customers subscribed to purchase solar energy in 100 kWh blocks. Pilot customers then
4 purchase the same fixed number of kWh of solar energy in each month according to the
5 number of blocks chosen at the time of their initial subscription. For example, if a customer
6 subscribed to 5 blocks of solar energy, then the customer would purchase 500 kWh of solar
7 energy each month. In both the pilot and proposed non-pilot program, the solar energy
8 purchased at a solar energy rate replaces a kWh purchased at the otherwise applicable base
9 rate. In order to minimize the possibility that a customer's fixed number of kWh of solar
10 energy exceeds their current month kWh of consumption, the pilot program restricted a
11 customer's enrollment in the program to 50 percent of their average monthly kWh.
12 Minimizing the possibility that a customer's fixed number of kWh of solar energy exceeds
13 their current month kWh of consumption is desirable because of the nature of the kWh
14 replacement mechanism. If customer's fixed number of kWh of solar energy exceeds their
15 current month kWh of consumption, then there is nothing for the excess kWh of solar
16 energy to replace. The possibility that a customer's fixed number of kWh of solar energy
17 exceeds their current month kWh consumption exists because customer's kWh
18 consumption typically varies from month to month. The fact that a customer's kWh
19 consumption varies from month to month, by definition, means that their kWh
20 consumption is higher than average in some months and lower than average in other
21 months. As discussed by Ms. Nauert's direct testimony, more than 50 percent of
22 participating customers expressed the desire to subscribe for more than 50 percent of their
23 kWh consumption. As the percentage of a participating customer's kWh consumption

1 increases, so does the probability that their fixed kWh of solar energy exceeds their kWh
2 consumption in any given month. Allowing customers to subscribe a fixed percentage of
3 their monthly load, rather than a fixed number of kWh, will allow customers to subscribe
4 a greater percentage of their annual kWh consumption, while completely avoiding the
5 possibility that a customer could be over-subscribed in any one month.

6 **Q. Please describe the proposed Community Solar Energy Rate that will**
7 **be charged for each kWh of solar energy under the Community Solar Program.**

8 A. At a high level, the basic form of the Community Solar Energy Rate will
9 remain largely unchanged relative to the basic form of the Total Solar Block Charge that
10 existed under the Community Solar Pilot Program. The Community Solar Energy Rate will
11 retain the same two distinct components which are present in the Total Solar Block Charge:
12 the Solar Generation Charge and the Total Facilities Charge, although their names will be
13 changed to the Solar Generation Rate and the Facilities Rate. Conceptually, the two
14 components will reflect the same costs incurred by the Company to serve customers with
15 solar energy resources. First, the Solar Generation Rate will continue to reflect the cost of
16 solar generation resources built by the Company to serve customers under the Community
17 Solar Program, as they did under the pilot, although the finite value of the Solar Generation
18 Rate will reflect the cost of solar generation resources built for the Community Solar
19 Program distinct from any cost associated with pilot solar generation resources. Second,
20 the Facilities Rate will continue to reflect the cost of installed plant necessary to deliver
21 solar energy to Community Solar Program customers. However, the Community Solar
22 Program proposal includes an additional cost category in the Facilities Rate that was not
23 included in the pilot's Total Facilities Charge. The additional cost category is the excess

1 portion of the fixed production (generation) plant cost. This additional cost is included to
2 reflect that fact that generation capacity beyond the solar generation resource capacity is
3 required to reliably serve Community Solar Program customers. In addition to this one
4 material change, the Community Solar Energy Rate deviates from the Total Solar Block
5 Charge in one cosmetic way. Under the pilot program, solar kWh were only sold in 100
6 kWh blocks, and therefore the energy rate could have been equivalently quoted in either as
7 the rate per 100 kWh or the rate per 1 kWh. The rate was quoted in terms of the rate per
8 100 kWh, rather than rate per 1 kWh. The proposed change from 100 kWh blocks to a
9 percentage of a customer's monthly kWh requires the rate to be quoted as the rate per 1
10 kWh.

11 **Q. Will customers served on time-of-use ("TOU") rate schedules be**
12 **eligible for service under the new Community Solar Program?**

13 A. Yes, unlike the Community Solar Pilot Program, customers on TOU rate
14 schedules will be eligible to participate in the Community Solar Program. The proposed
15 percentage based subscription mechanism provides a reasonable means to allocate the solar
16 energy subscription to the TOU periods that is also practical to implement. The Community
17 Solar subscription percentage, which represents the percentage of a customer's total kWh
18 usage that will be replaced by solar energy, can also be used to replace the same percentage
19 of kWh in each TOU period. This method is reasonable because it will allow customers on
20 TOU rate schedules to participate in the Community Solar Program and treats those
21 customers in a manner that is equitable relative to other customers who are not on TOU
22 rate schedules. The Community Solar Pilot Program will continue to provide blocks of
23 solar energy, will not have a percentage based subscription that provides a reasonable and

1 practical means to accommodate TOU customers, and therefore, TOU customers will
2 continue to be ineligible for the Community Solar Pilot Program.

3 **V. ECONOMIC DEVELOPMENT INCENTIVE**

4 **Q. Please describe your analysis of the Rider EDI realized rates.**

5 A. On June 1, 2018, Senate Bill 564 was signed into law as Section 393.1640,
6 RSMo. Section 393.1640 required the Company to make discounted rates available to
7 qualifying customers for up to five years. The average of the discount over five years must
8 be 40 percent under the law. The economic development incentive adjustment discussed
9 above reflects that fact that qualified customers applied for and were granted discounted
10 rates in compliance with Section 393.1640. The law also requires the realized rate paid by
11 customers receiving the discount to be greater than the variable cost of providing service
12 to customers receiving the discount in aggregate, and therefore also make a contribution to
13 fixed cost. There were four customers who were granted discounted rates under the
14 Company's Economic Development Incentive (Rider EDI, Sheet Nos. 86-86.5) during the
15 proposed test year January through December 2020. The first qualified customer began
16 receiving Rider EDI discounts in February 2020, two more began in May of 2020, and the
17 fourth began receiving discounts in August of 2020. Section 393.1640 and therefore Rider
18 EDI requires qualifying customers to receive an average discount on base rates of 40
19 percent over the five-year term of the discount, but allows customers to choose discounts
20 of 30, 40, or 50 percent in any given year of the five-year term. In order to determine if the
21 realized rates are greater than the Company's variable cost to serve the customers in
22 aggregate, and therefore contribute to fixed cost, we compute the realized rate for across
23 all customers assuming a 40 percent discount. We use all the available billing data in the

1 test year to estimate the realized rate we expect to collect across all Rider EDI customers
2 for the life of the contract. The realized rate paid by Rider EDI customers is \$0.0395/kWh,
3 and the variable cost to serve these same customers is \$0.0345/kWh. Therefore, the realized
4 rate paid by Rider EDI customers is greater than the variable cost to serve those customers,
5 and these customers make a positive contribution to fixed cost. See confidential Schedule
6 NSB-D3 for more on the analysis.

7 **VI. MISCELLANEOUS TARIFF UPDATES**

8 **Q. Were Rider EEIC Net Margin Revenue values updated to reflect rates**
9 **proposed in the Company's filing?**

10 A. Yes, the Rider EEIC Net Margin Revenue values were updated to reflect
11 the rates proposed in the Company's filing.

12 **Q. Have the Total Facilities Charges for the Community Solar Pilot**
13 **Program been updated in the Company's direct filing?**

14 A. An exemplary Community Solar Pilot Program rate sheet with updated
15 Total Facilities Charges is attached to my testimony as Schedule NSB-D4. The filing of an
16 updated Community Solar Pilot Program rate sheet with updated Total Facilities Charge in
17 the direct filing of this case is complicated by the recent Commission order granting a
18 certificate of convenience and necessity for the Company to construct a second solar
19 generation resource in File No. EA-2020-0371. The Company expects the second solar
20 generation resource to be constructed and go into service prior to the resolution of this case.
21 In the case that the new generation resource lowers the aggregate generation cost of solar
22 resources under the Community Solar Pilot Program, the Company is allowed to decrease
23 the Community Solar Pilot Program's Solar Generation Charge. An update to the Total

1 Facilities Charge cannot be filed with the other tariff sheet modifications that are initiating
2 this case because, as is typical with rate case filings, we would expect all tariff sheets to be
3 suspended, which would prevent the updating of the Solar Generation Charge. As such, an
4 exemplary Community Solar Pilot Program rate sheet is attached to my testimony. When
5 this case is resolved, the Company will file the Community Solar Pilot Program's rate sheet
6 with updated Total Facilities Charge consistent with the Commission's final order in this
7 case as part of the compliance tariffs that will be filed to implement the Commission's
8 order.

9 **Q. Does this conclude your direct testimony?**

10 A. Yes, it does.

	1M Totals	1M Summer	1M Winter
Customer Count	12,940,006	4,313,335	8,626,671
Total kWh	13,311,574,275	4,815,950,092	8,495,624,182
Total Block 1 kWh	9,693,180,687	4,815,950,092	4,877,230,594
Total Block 2 kWh	3,618,393,588	0	3,618,393,588

	1MTOD Totals	1MTOD Summer	1MTOD Winter
Customer Count	1,080	360	720
Total kWh	1,559,705	531,791	1,027,915
Total Block 1 kWh	1,013,283	531,791	481,492
Total Block 2 kWh	546,423	0	546,423
Off Peak kWh	453,117	453,117	0
On Peak kWh	78,674	78,674	0

	1MTOU2 Totals	1MTOU2 Summer	1MTOU2 Winter
Customer Count	48	16	32
Total kWh	56,781	19,511	37,270
Total Block 1 kWh	49,305	19,511	29,794
Total Block 2 kWh	7,476	0	7,476
Off Peak kWh	16,514	9,137	7,377
On Peak kWh	20,476	10,374	10,102

	1MTOUSmartSaver Totals	1MTOUSmartSaver Summer	1MTOUSmartSaver Winter
Customer Count	156	52	104
Total kWh	122,005	47,575	74,430
Total Block 1 kWh	109,756	47,575	62,180
Total Block 2 kWh	12,249	0	12,249
Off Peak kWh	26,926	17,619	9,307
Mid Peak kWh	39,653	27,640	12,013
On Peak kWh	5,035	2,317	2,718

	2M Total Total	2M Total Summer	2M Total Winter
Total Customer Count	1,829,806	609,935	1,219,870
1 Phase Customer Count	1,135,088	378,602	756,486
3 Phase Customer Count	464,592	154,691	309,901
Unmetered Customer Count	83,062	27,694	55,368
No Charge Customer Count	131,545	43,825	87,720
1 Phase TOU Customer Count	13,831	4,565	9,266
3 Phase TOU Customer Count	1,687	557	1,130
Total kWh	3,080,833,355	1,084,491,901	1,996,341,454
Base kWh	2,508,241,646	1,045,353,987	1,462,887,658
Seasonal kWh	458,902,803	0	458,902,803
Off Peak kWh	71,608,179	24,478,506	47,129,672
On Peak kWh	39,729,980	13,882,204	25,847,775
Cell kWh	2,350,747	777,203	1,573,544

	3M Total Totals	3M Total Summer	3M Total Winter
Customer Count	128,074	42,691	85,383
TOU Customer Count	501	174	327
Total kWh	7,183,723,899	2,579,583,472	4,604,140,427
Base kWh	4,195,249,891	0	4,195,249,891
Seasonal kWh	408,429,624	0	408,429,624
Total Block 1 kWh	2,671,364,037	1,016,971,346	1,654,392,691
Total Block 2 kWh	2,860,206,650	1,089,830,895	1,770,375,754
Total Block 3 kWh	1,243,262,676	472,781,230	770,481,446
Off Peak kWh	28,988,275	10,806,297	18,181,978
On Peak kWh	14,450,572	5,617,128	8,833,444
Demand kW	22,407,215	7,727,878	14,679,337

	Total 4M Totals	Total 4M Summer	Total 4M Winter
Customer Count	7,993	2,664	5,329
TOU Customer Count	213	72	141
Total kWh	3,618,415,921	1,303,883,034	2,314,532,887
Base kWh	2,115,506,303	0	2,115,506,303
Seasonal kWh	198,851,110	0	198,851,110
Total Block 1 kWh	1,082,855,754	412,137,993	670,717,761
Total Block 2 kWh	1,313,022,415	499,538,596	813,483,819
Total Block 3 kWh	1,023,507,219	392,202,496	631,304,723
Off Peak kWh	74,427,897	28,721,453	45,706,444
On Peak kWh	35,617,191	12,988,331	22,628,860
Demand kW	7,916,192	2,785,023	5,131,169
Rider B 34.5/69 kV	847,321	283,436	563,885
Rider B 138 kV	6,431	2,216	4,216
Reactive kVar	1,310,772	504,126	806,646

	11M Totals	11M Summer	11M Winter
CustomerCount	768	256	512
TOU Customer Count	60	20	40
Total kWh	3,554,828,072	1,300,864,051	2,253,964,021
Off Peak kWh	225,032,664	78,864,615	146,168,049
On Peak kWh	113,520,652	40,059,179	73,461,474
Demand kW	6,533,318	2,312,930	4,220,388
Reactive kVar	340,282	125,911	214,371
Rider B 34.5/69 kV	1,759,456	617,527	1,141,929
Rider B 138 kV	630,519	216,940	413,579

Note: A small difference exists between the sum of seasonal, block 1, block 2, block 3 kWh and total kWh for the LGS (3M) and SPS (4M) classes. The difference is explained almost entirely by small differences between the sum and total in the month of October. 100 and 98 percent of the difference for LGS and SPS classes respectively is explained by a difference in October with the remainder explained by a difference in September.

MO.P.S.C. SCHEDULE NO. 6 3rd Revised SHEET NO. 89CANCELLING MO.P.S.C. SCHEDULE NO. 6 2nd Revised SHEET NO. 89APPLYING TO MISSOURI SERVICE AREARIDER CSP
COMMUNITY SOLAR PROGRAMPURPOSE

The purpose of the Community Solar Program ("Program") is to offer eligible Customers the opportunity to voluntarily subscribe to a community solar energy product associated with new solar generation resources ("Resource") to be developed for the Program.

PROGRAM DESCRIPTION

Under the Program, eligible Customers can elect to receive community solar energy service ("CS Service") which replaces a fixed percentage of kilowatt-hours (kWh) of electricity the customer would receive under their otherwise applicable service classification with kWh of solar energy.

AVAILABILITY

CS Service is only available to full service electric customers currently served by the Company under either Company Service Classification Residential Service 1(M) or Small General Service 2(M). Service hereunder is provided through one meter to one end-use customer and may not be redistributed or resold. Participants will be enrolled on a first-enrolled, first-served basis. Participants can enroll or cancel subject to the Program Provisions and Special Terms. Customers will be deemed ineligible for the Program if they have received a disconnection notice within twelve (12) months preceding their application.

DEFINITIONS

Community Solar Energy Rate - The sum of the Facilities Rate and Solar Generation Rate.

Facilities Rate - A \$/kWh rate applicable to a subscriber's Solar Energy Subscription for electrical facilities necessary to delivery solar energy.

Program Resource - A solar generation resource developed as a result of the Program.

Resource Term - The resource term shall be 25 years from the date the Program Resource is placed into service.

Solar Energy Subscription - The number of kWh of solar energy purchased by a CS Service subscriber in a specific billing month. The number of kWh is equal to the subscriber's Subscription Percentage multiplied by the customer's current billing month energy usage.

Solar Availability Bank - The total amount of kWh available for Solar Energy Subscription based on the expected average annual production over the life of Program Resources minus expected Solar Energy Subscriptions covered by existing subscriptions.

Solar Generation Rate - A \$/kWh rate applicable to a subscriber's Solar Energy Subscription for the production of solar energy.

Subscription Percentage (1-100%) - An eligible customer may subscribe to replace a percentage of each billing month's energy usage with Solar Energy in single percentage increments up to 100%.

DATE OF ISSUE March 31, 2021 DATE EFFECTIVE April 30, 2021ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6 4th Revised SHEET NO. 89.1CANCELLING MO.P.S.C. SCHEDULE NO. 6 3rd Revised SHEET NO. 89.1APPLYING TO MISSOURI SERVICE AREARIDER CSP
COMMUNITY SOLAR PROGRAM (Cont'd.)MONTHLY BILL

All terms and conditions of the customer's applicable service classification shall apply to this Program with the following exception:

The Solar Energy Subscription supplied under this Program, pursuant to the customer's Subscription Percentage, will replace an equal amount of kWh which the customer would be billed under the Energy Charge of their otherwise applicable service classification.

For customers on time-of-use rates, the Subscription Percentage will be applied equally to current billing month energy usage in each time-of-use period, such that the sum of solar energy across time-of-use periods is equal to the customer's Solar Energy Subscription.

The Solar Energy Subscription will be billed at the sum of the Facilities Rate and the Solar Generation Rate, the Community Solar Energy Rate. All other usage-based charges in the customer's service classification will be billed at the actual metered electricity usage.

TERM OF ENROLLMENT

Once a Program Resource has been placed in service under this Program, enrolled customers that receive CS Service may continue said service for the Resource Term unless they cancel service under the Program, and new customers will be allowed to receive service under the Program to the extent there exists a Solar Availability Bank.

If additional Program Resources are added to the Program, enrolled customers may continue to receive CS Service beyond the length of the Resource Term to the extent there exists a Solar Availability Bank beyond the Resource Term.

This tariff shall immediately become void, and the Company shall have no further obligations or liabilities hereunder, if any term or terms of this Program are determined to be discriminatory or otherwise unlawful by a court of competent jurisdiction.

PROGRAM PROVISIONS AND SPECIAL TERMS

1. All rights to the solar renewable energy certificates (SRECs) associated with the generation output of the Resource(s) will be owned by the Company and will be retired on behalf of participants within the Commission-approved tracking system. The Company reserves the right to purchase RECs outside the program for the purpose of balancing subscriptions and generation.
2. Enrollment; Participation Fee; Commitment:
 - a. The Company may construct new Resources if there are sufficient subscriptions to support the Resources and the Commission approves a Certificate or Certificates of Convenience and Necessity (CCN). Upon grant of a CCN, construction of a new Resource shall not begin until at least 50 percent of the Resource's solar energy is subscribed or able to be filled through the waitlist.

DATE OF ISSUE March 31, 2021 DATE EFFECTIVE April 30, 2021ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6 4th Revised SHEET NO. 89.2CANCELLING MO.P.S.C. SCHEDULE NO. 6 3rd Revised SHEET NO. 89.2APPLYING TO MISSOURI SERVICE AREARIDER CSPCOMMUNITY SOLAR PROGRAM (Cont'd.)PROGRAM PROVISIONS AND SPECIAL TERMS (Cont'd.)

2. Enrollment; Participation Fee; Commitment: (Cont'd.)
- b. Customers enrolling in the Program will be assigned until such time as all of the solar energy for existing Resources is subscribed. If all solar energy is subscribed, a customer may still be placed on a waitlist. Upon enrollment, all customers shall pay a Program participation fee of \$25. Collected Program participation fees will be treated by the Company as a Contribution in Aid of Construction upon construction of the Resource.
- c. On and after the date the Company commits to construct a Resource, which commitment shall occur upon the Company posting its commitment on its website and sending an e-mail, if available, or by letter, announcing its commitment to the enrollees assigned to the solar energy of a Resource, said enrollees will be obligated to participate in the Program and pay the charges thereunder for a term of two years after the Resource's in-service date, unless the customer no longer takes service from the Company. Until said committal date, an enrollee may withdraw from the Program via the Company's website or by calling the Company's toll-free customer service line and shall receive a refund of the enrollee's Program participation fee. However, a customer that is a participant in the Program will be permitted to withdraw from the Program before the two-year commitment period has been completed only if a customer on the waitlist for which there is not a solar energy available can take the withdrawing participant's place, and the withdrawing participant will not be refunded any fees.
- d. Customers may enroll in the Program via the Company's website or by calling the Company's toll-free customer service line after the Company has committed to build a Resource, and throughout the Program's operation, during any period when there exists a Solar Availability Bank, without paying a Program participation fee. The Company will maintain a waiting list of customers interested in enrolling in the Program during periods when there is no Solar Availability Bank, and will notify customers on the waiting list via e-mail or letter when the Bank becomes available.
3. The Solar Generation Rate associated with Solar Energy Subscriptions will be capped for the Resource Term at the initially offered level, but may decrease if incremental capacity additions to or retirements from the Resources occur and result in a lower aggregate levelized cost of all Resources placed in service under this Program. The Total Facilities Rate will be subject to adjustment in each general rate case.
4. Where an additional Resource is added to the Program, the levelized cost of the new Resource will be averaged with the remaining levelized cost of existing Resource to determine the new levelized cost that determines the Solar Generation Charge and contributes to the total cost of a Solar Energy Subscription. This change would apply to all subscribers under the Program.
5. Payments for Solar Energy Subscriptions will be due no later than the due date shown on the bill and will be incorporated into the customer's standard billing cycle.

DATE OF ISSUE March 31, 2021 DATE EFFECTIVE April 30, 2021ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6 3rd Revised SHEET NO. 89.3

CANCELLING MO.P.S.C. SCHEDULE NO. 6 2nd Revised SHEET NO. 89.3

APPLYING TO MISSOURI SERVICE AREA

RIDER CSP
COMMUNITY SOLAR PROGRAM (Cont'd.)

PROGRAM PROVISIONS AND SPECIAL TERMS (Cont'd.)

6. Any customer being served or having been served on this Program waives all rights to any billing adjustments arising from a claim that the customer's service would be at a lower cost had the customer not participated in the Program for any period of time.
7. If a customer moves to another location within the Company's Missouri service territory the customer's subscription will also transfer.
8. Subscription cancelations will result in available Solar Energy Subscription going back into the Solar Availability Bank.
9. After the expiration of any two-year commitment as provided for in paragraph 2.c, customers that subscribe will continue as Program participants until they cancel their subscription or the Program is terminated, whichever occurs first. For enrollments occurring 20 or more days before a customer's next billing cycle, enrollment fees or refunds of participation fees, if otherwise allowed hereunder, shall be charged or credited, as appropriate, via the customer's bill in that next billing cycle; otherwise, in the second billing cycle after enrollment or withdrawal.
10. Any customer who terminates Program participation must wait three (3) months after the first billing cycle without a subscription to re-enroll in the Program.
11. Customers with Net Metering agreements are ineligible for the Program.

GENERAL RULES AND REGULATIONS

In addition to the above specific rules and regulations, all of Company's General Rules and Regulations shall apply to service supplied under this Program.

SOLAR ENERGY RATES

Subject to the Program Provisions and Special Terms:

Residential Service 1(M)	
Solar Generation Rate	\$ 0.XXXX
Facilities Rate	\$ 0.066
Community Solar Energy Rate	\$ 0.XXXX

Small General Service 2(M)	
Solar Generation Rate	\$ 0.XXXX
Facilities Rate	\$ 0.053
Community Solar Energy Rate	\$ 0.XXXX

DATE OF ISSUE March 31, 2021 DATE EFFECTIVE April 30, 2021

ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6

2nd Revised

SHEET NO. 89.4

CANCELLING MO.P.S.C. SCHEDULE NO. 6

1st Revised

SHEET NO. 89.4

APPLYING TO

MISSOURI SERVICE AREA

*THIS SHEET RESERVED FOR FUTURE USE

*Indicates Change.

Issued pursuant to the Order of the Mo.P.S.C. in Case No. ER-2019-0335.

DATE OF ISSUE March 18, 2020

DATE EFFECTIVE April 1, 2020

ISSUED BY Martin J. Lyons
NAME OF OFFICER

Chairman & President
TITLE

St. Louis, Missouri
ADDRESS

ER-2021-0240
SCHEDULE NSB-D3
HAS BEEN MARKED
CONFIDENTIAL IN ITS
ENTIRETY

PUBLIC

Schedule NSB-D3

MO.P.S.C. SCHEDULE NO. 6

3rd Revised

SHEET NO. 158

CANCELLING MO.P.S.C. SCHEDULE NO. 6

2nd Revised

SHEET NO. 158

APPLYING TO MISSOURI SERVICE AREA

COMMUNITY SOLAR PILOT PROGRAM

PURPOSE

The purpose of the Community Solar Pilot Program (Program) is to examine the interest of customers in an opportunity to subscribe to a designated solar resource (Resource) within the Company's Missouri service territory.

PROGRAM DESCRIPTION

Program participants will subscribe to and enroll in the Program and by doing so, agree to pay for Solar Blocks of 100 kilowatt-hour (kWh) each that will replace an equivalent kWh amount of electricity they receive from their standard class of service.

AVAILABILITY

Electric service under this Program is only available to full service electric customers currently served by the Company. Customers can replace up to 50% of their average annual energy usage. Customers must qualify for service under either Company Service Classification Residential Service 1(M) or Small General Service 2(M). Customers will be deemed ineligible for the Program if they have received a disconnection notice within twelve (12) months preceding their application.

Participants will be enrolled on a first-come, first-served basis. Participants can enroll or cancel subject to the Program Provisions and Special Terms. Service hereunder is provided through one meter to one end-use customer and may not be redistributed or resold.

DEFINITIONS

Solar Block - 100 kWh of solar energy per billing month. The number of blocks available will be determined by the total estimated average annual production over the life of the Resource.

- * Solar Availability Bank - The number of Solar Blocks available for subscription in any given month, for a specific Resource, based on the estimated average annual production over the life of the Resource minus Solar Blocks covered by existing subscriptions.
- * Term of Enrollment - The enrollment term shall expire October 13, 2021.
- * Resource Term - The resource term shall be 25 years from the date of the Resource being placed into service.

**** MONTHLY BILL**

All terms and conditions of the customer's applicable standard service classification tariff shall apply to this Program with the following exception:

The Solar Blocks supplied under this Program, pursuant to the customer's subscribed amount, will replace an equal amount of kWh the customer would otherwise be billed under their Energy Charge and Energy Efficiency Program Charge.

All other usage-based charges in the customer's applicable tariff schedule will be billed at the actual metered electricity usage.

*Indicates Change. **Indicates Reissue.

DATE OF ISSUE May 28, 2020 DATE EFFECTIVE June 8, 2020

ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6

2nd Revised

SHEET NO. 158.1

CANCELLING MO.P.S.C. SCHEDULE NO. 6

1st Revised

SHEET NO. 158.1

APPLYING TO MISSOURI SERVICE AREA

COMMUNITY SOLAR PILOT PROGRAM (Cont'd.)

* TERM OF ENROLLMENT

Once a Resource has been placed in service under this Program, enrolled customers that also receive service under this tariff may continue said service for the Resource Term unless they cancel service under the program, and new customers will be allowed to receive service under the Program to the extent there exists a Solar Availability Bank for a given Resource.

If more than one Resource exists under the Program, the remaining length of the Resource Term will depend on the Resource that is assigned to an individual participant. In the event there are available Solar Blocks in the Solar Availability Bank for more than one Resource, the Resource with the shorter remaining Resource Term will be assigned first.

This tariff shall immediately become void, and the Company shall have no further obligations or liabilities hereunder, if any term or terms of this Program are determined to be discriminatory or otherwise unlawful by a court of competent jurisdiction.

PROGRAM PROVISIONS AND SPECIAL TERMS

- 1. Qualifying customers are eligible to subscribe to at least one (1) Solar Block, regardless of their annual usage, as long as they meet all other provisions.
- 2. In any given billing month, an unused Solar Block or portion of a Solar Block subscribed by customer will not be carried over into any subsequent billing month.
- * 3. All rights to the solar renewable energy certificates (SREC) associated with the generation output of the Resource(s) will be owned by the Company and will be retired on behalf of participants within the Commission-approved tracking system.
- 4. Enrollment; Participation Fee; Commitment:
 - * a. The Company may construct new Resources if there are sufficient subscriptions to support the Resources and the Commission approves a Certificate or Certificates of Convenience and Necessity (CCN). Upon grant of a CCN, construction of a new Resource shall not begin until at least 90 percent of the Resource's solar blocks are subscribed or able to be filled through the waitlist.
 - * b. Customers enrolling in the Program will be assigned to the Resources until such time as all of the Solar Blocks for existing Resources are subscribed. If all Solar Blocks are subscribed, a customer may still be placed on a waitlist for a new Resource and, upon enrollment, such customers shall pay a Program participation fee of \$25 per block. Collected Program participation fees will be treated by the Company as a Contribution in Aid of Construction upon construction of the Resource.

*Indicates Change

DATE OF ISSUE May 28, 2020 DATE EFFECTIVE June 8, 2020

ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6

1st Revised

SHEET NO. 158.2

CANCELLING MO.P.S.C. SCHEDULE NO. 6

Original

SHEET NO. 158.2

APPLYING TO MISSOURI SERVICE AREA

COMMUNITY SOLAR PILOT PROGRAM (Cont'd.)

PROGRAM PROVISIONS AND SPECIAL TERMS (Cont'd.)

- * c. On and after the date the Company commits to construct a Resource, which commitment shall occur upon the Company posting its commitment on its website and sending an e-mail, if available, or by letter, announcing its commitment to the enrollees assigned to a Resource, said enrollees will be obligated to participate in the Program and pay the charges thereunder for a term of two years after the Resource's in-service date, unless the customer no longer takes service from the Company. Until said committal date, an enrollee may withdraw from the Program via the Company's website or by calling the Company's toll-free customer service line and shall receive a refund of the enrollee's Program participation fee. However, a customer that is a participant in the Program will be permitted to withdraw from the Program before the two-year commitment period has been completed only if a customer on the waitlist for which there is not a Resource available can take the withdrawing participant's place for the Resource, and the withdrawing participant will not be refunded any fees.
- * d. Any enrollee from whom a Program participation fee has been collected who has not received service from the Resource by the earlier of (i) the date the Company commits to the Resource, or (ii) October 13, 2021, will be refunded the Program participation fee.
- e. Customers may enroll in the Program via the Company's website or by calling the Company's toll-free customer service line after the Company has committed to build the Resource, and throughout the Program's operation, during any period when there exists a Solar Availability Bank, without paying a Program participation fee. The Company will maintain a waiting list of customers interested in enrolling in the Program during periods when there is no Solar Availability Bank, and will notify customers on the waiting list via e-mail or letter when the Bank becomes available.
- ** f. The Company will continue to share the risk for undersubscribed Resources as discussed in paragraph 15 of the Amended Unanimous Stipulation And Agreement filed in EA-2016-0207.
- * 5. The Solar Generation Charge associated with the Solar Block will be capped for Resource Term at the initially offered level, but may decrease if incremental capacity additions to or retirements from the Resources occur and result in a lower aggregate functionalized generation cost of all Resources placed in service under this Program. The Total Facilities Charge will be subject to adjustment in each general rate case during the applicable Resource Term.
- *** 6. Where an additional Resource is added to the Program, the levelized cost of the new Resource will be averaged with the remaining levelized cost of existing Resource to determine the new fixed levelized cost that determines the Solar Generation Charge and contributes to the total cost of the Solar Block. This change would apply to all subscribers under the Program.
- *** 7. Payments for Solar Blocks will be due no later than the due date shown on the bill and will be incorporated into the customer's standard billing cycle.

*Indicates Change. **Indicates Addition. ***Indicates Reissue.

DATE OF ISSUE May 28, 2020 DATE EFFECTIVE June 8, 2020

ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

MO.P.S.C. SCHEDULE NO. 6

1st Revised

SHEET NO. 158.3

CANCELLING MO.P.S.C. SCHEDULE NO. 6

Original

SHEET NO. 158.3

APPLYING TO MISSOURI SERVICE AREA

COMMUNITY SOLAR PILOT PROGRAM (Cont'd.)

PROGRAM PROVISIONS AND SPECIAL TERMS (Cont'd.)

- 8. Any customer being served or having been served on this Program waives all rights to any billing adjustments arising from a claim that the customer's service would be at a lower cost had the customer not participated in the Program for any period of time.
- 9. If a customer moves to another location within the Company's Missouri service territory the customer's subscription will also transfer.
- 10. Subscription cancelations will result in available Solar Blocks going back into the Solar Availability Bank. Any surplus of kWh from Solar Blocks will be forfeited back into the Solar Availability Bank without any monetary reimbursement to subscriber.
- 11. After the expiration of any two-year commitment as provided for in paragraph 4.B, customers that subscribe will continue as Program participants until they cancel their subscription or the Program is terminated, whichever occurs first. For enrollments occurring 20 or more days before a customer's next billing cycle, enrollment fees or refunds of participation fees, if otherwise allowed hereunder, shall be charged or credited, as appropriate, via the customer's bill in that next billing cycle; otherwise, in the second billing cycle after enrollment or withdrawal.
- 12. Any customer who terminates Program participation must wait three (3) months after the first billing cycle without a subscription to re-enroll in the Program.
- * 13. Customers with Net Metering agreements and customers served on Time-of-Use Service rate schedules other than the Residential Daytime/Overnight rate schedule are ineligible for the Program.

GENERAL RULES AND REGULATIONS

In addition to the above specific rules and regulations, all of Company's General Rules and Regulations shall apply to service supplied under this Program.

** SOLAR BLOCK MONTHLY CHARGES

Subject to the Program Provisions and Special Terms set forth below:

Solar Block Charges for a 100 kWh Block

<u>Service Classification</u>	<u>Residential Service 1 (M)</u>	<u>Small General Service 2 (M)</u>
Solar Generation Charge	\$ 10.78	\$ 10.78
*Total Facilities Charge	<u>\$ 3.64</u>	<u>\$ 2.81</u>
*Total Solar Block Charge	\$ 14.42	\$ 13.59

*Indicates Change. **Indicated Reissue.

DATE OF ISSUE May 28, 2020 DATE EFFECTIVE June 8, 2020

ISSUED BY Martin J. Lyons Chairman & President St. Louis, Missouri
NAME OF OFFICER TITLE ADDRESS

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

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

AFFIDAVIT OF NICHOLAS BOWDEN, PhD

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

Nicholas Bowden, PhD, being first duly sworn on his oath, states:

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

/S/ Nicholas Bowden, PhD
Nicholas Bowden, PhD

Sworn to me this 30th day of March, 2021.