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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. ER-2021-0240

REBUTTAL TESTIMONY

OF

NICHOLAS BOWDEN, PhD

ON

BEHALF OF

UNION ELECTRIC COMPANY

D/B/A AMEREN MISSOURI

St. Louis, Missouri
October 15, 2021

TABLE OF CONTENTS

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OF

NICHOLAS BOWDEN, PhD

FILE NO. ER-2021-0240

I. INTRODUCTION

Q. Please state your name and business address.

A. My name is Nicholas Bowden. My business address is One Ameren Plaza, 1901 Chouteau Ave., St. Louis, Missouri.

Q. Are you the same Nicholas Bowden, PhD that submitted direct testimony in this case?

A. Yes, I am.

Q. To what testimony or issues are you responding?

A. I am responding to the Missouri Industrial Energy Consumers ("MIEC") and Staff witnesses' direct testimony regarding various billing unit adjustments. Specifically, I respond to:

1. The direct testimony of MIEC witness Greg R. Meyer concerning Residential and Small General Service revenues.

2. Staff direct testimony related to the following normalized revenue adjustments:

   a. Seasonal Proration Adjustment;

   b. Weather Normalization of Residential Block 1 and 2;

   c. MEEIA Annualization Adjustment;

   d. Rider EDI Discount Adjustment; and

   e. Rate Switching and Large Customer Normalization Adjustment.

3. Staff direct testimony related to the Community Solar Pilot Program.

II. MIEC'S PROPOSAL DISREGARDS KNOWN AND MEASURABLE VARIATIONS AND SHOULD BE REJECTED

Q. What is MIEC witness Meyer's position on the Company's normalized revenues at current rates?

A. Mr. Meyer claims that the Company's normalized revenues at current rates are significantly understated because the Company's kilowatt-hour ("kWh") usage per customer is understated for the Residential and Small General Service classes. Therefore, Mr. Meyer claims the Company's requested revenue increase is overstated.[1]

My response to Mr. Meyer is twofold. First, he does not use sufficient data to support his claim and, second, the method used by Mr. Meyer to support his claim is inadequate, which invalidates the conclusions drawn by Mr. Meyer. Therefore, the Commission should reject Mr. Meyer's proposals.

Q. How does Mr. Meyer characterize the typical calculation of normalized revenue at current rates?

A. Mr. Meyer claims that normalized revenues are generally calculated by first determining a normalized level of usage per customer. Implicitly, Mr. Meyer claims that this is or can be done on an annual basis, because that is the basis upon which he determines usage per customer.

Mr. Meyer claims the normalized annual usage per customer should be multiplied by the total number of customers to determine total normalized usage, and then that total usage should be multiplied by current rates to arrive at the normalized revenue.[2]

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[1] Direct Testimony of MIEC witness Greg R. Meyer, pp. 23–24.
[2] Direct Testimony of MIEC witness Greg R. Meyer, p. 24.

Q. Is Mr. Meyer correct to characterize the typical normalized revenue calculation as a calculation based on annual usage per customer?

A. No, both the Company and Staff calculate the normalized usage by month at the class level. Given the number of customers in a class, monthly usages imply an average monthly usage per customer. If one aggregates revenues across months and averages customers across months, then one can also calculate an implied annual average usage per customer. However, that annual usage per customer is a result of the actual normalization process, and is not the determinant of it.

Normalizing billing units, and consequently revenues, by month is important, because it allows important sources of variation, like the weather, to have different impacts on billing units at different times across the year. For instance, higher than normal temperatures tend to increase billing units in summer months, but decrease billing units in winter months. It is not possible to accurately capture this relationship between weather and billing units using annual usage and weather data. Therefore, it is not possible to accurately normalize usage on an annual basis.

Furthermore, an annual average usage per customer cannot alone be used to calculate normalized revenue, because the Company has rates that vary by season, and, therefore, the distribution of usage by month, or at least by season, must be determined. Despite Mr. Meyer's objection to the Company's implied annual average usage per customer, he, nonetheless, uses the Company's monthly class level usages to separate his annual usage into winter and summer seasonal usage levels. However, this choice reflects a preference for convenience, at the expense of consistency, completeness, and accuracy.

Q. Why does it appear that Mr. Meyer characterizes the calculation of normalized revenue in the fashion explained above?

A. In the worst case, it could be that Mr. Meyer characterizes the calculation this way in order to exploit the convenience of annual FERC Form 1 data to achieve a specific result. The inaccuracy of Mr. Meyer's characterization is further evidenced by the failure to actually calculate total normalized revenue. Instead, Mr. Meyer chooses to simply calculate an adjustment. Even though Mr. Meyer avoids calculating normalized revenues, his calculation of an adjustment requires assumptions. These assumptions would be unnecessary had Mr. Meyer actually performed an analysis consistent with the calculation of normalized revenues.

Q. Please describe the method Mr. Meyer uses to generate an adjustment to the Company's proposed normalized revenue.

A. Mr. Meyer's method can be accurately described as visual inspection and ad hoc selection of values from tables from the Company's FERC Form 1 data.

Mr. Meyer presents three tables and each table includes one variable, so he presents a total of three variables for visual inspection. Those three variables include total annual kWh usage, customer count, and annual kWh usage per customer. The annual kWh usage per customer data in the third table, which is actually derived from the data in the first two, is the focus of Mr. Meyer's visual inspection and ad hoc selection method. The FERC Form 1 data presented is annual and spans the ten years between 2011 and 2020.

Mr. Meyer's first step is to present total annual kWh usage data from the FERC Form 1. Mr. Meyer compares the ten years of FERC Form 1 total annual kWh usage data to the total annual kWh usage proposed by the Company in this proceeding. Mr. Meyer observes that the total annual kWh usage proposed by the Company in this case is lower than many of the usages in the FERC Form 1 data.

Second, Mr. Meyer presents customer count data from the FERC Form 1. Mr. Meyer observes that customer counts have grown.

Third, Mr. Meyer presents annual kWh usage per customer data from the FERC Form 1. Mr. Meyer compares the ten years of FERC Form 1 annual kWh usage per customer data to the annual kWh usage per customer implied by total annual kWh and customer count filed by the Company. As a result of this visual inspection, Mr. Meyer concludes that the annual kWh usage per customer filed by the Company is too low. Mr. Meyer offers no further explanation, but simply asserts that it is obvious. Mr. Meyer then chooses an annual kWh usage per customer from the table that is greater than the annual kWh usage per customer filed in the Company's proposal.

Once Mr. Meyer has chosen an annual kWh usage per customer from the table, he multiplies that value by the Company's estimate of customer count for September 2021 to determine MIEC's proposed total annual kWh usage. Mr. Meyer then calculates the difference between the MIEC's proposed total annual kWh usage and the Company's total annual kWh usage. Mr. Meyer then uses the relative proportions of winter and summer kWh usage from the Company's filing to split the difference into winter and summer kWh components. The winter and summer kWh components of the difference are multiplied by winter and summer rates to produce the adjustment to normalized revenue that Mr. Meyer proposes in this case.

Q. What is the methodological logic for the selection of the annual kWh usage per customer employed by Mr. Meyer?

A. Generally speaking, there is none. In this case specifically, the logic appears to be result oriented, that is, designed to select an annual kWh usage per customer greater than the Company proposed.

Q. Did Mr. Meyer weather normalize the data visually inspected in his analysis?

A. No, Mr. Meyer did not weather normalize the data. Furthermore, he did nothing to normalize the data in any way.

Q. Why is it critical to normalize the usage data?

A. It is critical to normalize usage data because known and measurable factors, like the weather, have significant impacts on electricity usage. Since the weather and its impact on electricity usage are known and measurable, year-to-year variation in electricity usage caused by year-to-year variation in weather must be removed from usage data. The result is normalized usage, i.e. usage that can be compared year-to-year.

Mr. Meyer's failure to normalize electricity usage for weather or any other factor causes inference from observations of usage across years to be invalid. Nonetheless, Mr. Meyer implies that his selection is supported by visual inspection of the data across years. Mr. Meyer's selection is based on his inference that usage per customer proposed by the Company is too low. Aside from the lack of methodological rigor and completeness, the inference made during the visually inspect and select method is invalidated by the failure to normalize usage for known and measurable variation in other variables, like the weather.

Q. Are there other examples of important known and measurable variables that impact usage per customer, which Mr. Meyer ignores?

A. Yes. Energy or kWh savings from Company-sponsored energy efficiency programs are known and measurable and have a significant impact on usage per customer.

Q. Do you have an estimate of the impact Company-sponsored energy efficiency programs have had on Residential and Small General Service customers' usage per customer between 2011 and 2020?

A. Yes. Between 2011 and 2020, average annual Residential usage per customer decreased as a result of Company-sponsored energy efficiency programs by 1,231 kWh. Between 2011 and 2020, average annual Small General Service usage per customer decreased as a result of Company sponsored energy efficiency programs by 2,278 kWh. Mr. Meyer's approach completely fails to capture or even acknowledge that these usage reductions have occurred.

Q. How do these facts invalidate the proposal made by Mr. Meyer?

A. Mr. Meyer looks at usage data between 2011 and 2020 and concludes that the Company's proposed usage level is too low, because it is lower than usage in earlier years in the FERC Form 1 data. On the contrary, we should expect normalized usage to be lower in 2020 than previous years because of the effect Company-sponsored energy efficiency programs have on usage per customer. Indeed, that is the very purpose of having the energy efficiency programs in the first place: to reduce usage.

While it is not valid to draw any conclusion about the precise relationship between energy efficiency and the FERC Form 1 data, due to the confounding influence of weather, the broad trend in the FERC Form 1 data is consistent with the effect of Company-sponsored energy efficiency programs. The broad trend in the FERC Form 1 usage per customer data and the cumulative effect of Company-sponsored energy efficiency are similar in magnitude.

In summary, the Company's proposed kWh usage levels are supported by the broad trend in FERC Form 1 data and the kWh savings achieved by Company-sponsored energy efficiency programs. Mr. Meyer's complete disregard of the relationship between Company-sponsored energy efficiency and usage per customer over time further undermines his conclusions and proposed adjustment.

Q. Are there other energy efficiency-related impacts that are driving usage per customer down?

A. Yes. Aside from energy savings spurred by the Company's energy efficiency programs, usage is also being driven down by forces other than the Company's programs, such as federal appliance standards, that result in a more efficient appliance stock over time. I have not similarly quantified the magnitude of those forces, but they would similarly put downward pressure on usage per customer.

Q. Are there any other errors made by Mr. Meyer which further invalidate his analysis?

A. Yes. Mr. Meyer fails to recognize that there is a discontinuity in number of customers reported as Small General Service starting midway through the data series he presents for visual inspection. Between 2014 and 2015, the number of Small General Service customers reported in the FERC Form 1 increases by more than 15,000 customers. The average increase in the population of Small General Service in all the other years presented by Mr. Meyer is 920. Mr. Meyer also fails to recognize that this discontinuity is coincident with a discontinuous decrease in the Small General Service usage per customer reported in the FERC Form 1.

Between 2014 and 2015, Small General Service usage per customer reported in the FERC Form 1 decreases by 3,591 kWh. As noted previously, it is hard to make year-to-year comparisons using this FERC Form 1 data because it is not normalized for weather or other factors. Nonetheless, this decrease is extreme. The extreme nature of this decrease relative to the observable variation in other years suggest there was a change in reporting which shifted a large number of customers into the FERC Form 1 Small General Service category, and those customers were much smaller than the average customer already existing in the Small General Service category.

A large discontinuous increase in smaller than average Small General Service customers caused by a shift in reporting is yet another flaw in Mr. Meyer's approach that invalidates any conclusion made based on the comparison of average usage before and after the discontinuity. Even if Mr. Meyer cannot verify the source of this discontinuity, this is a failure in analytical scrutiny, and further undermines credibility of his proposal.

III. STAFF'S SEASONAL PRORATION ADJUSTMENTS ARE FLAWED, AND SHOULD NOT BE ADOPTED

Q. What specific errors did you identify in the method Staff used to calculate its Seasonal Proration Adjustment?

A. Staff relied on assumed relationships between each billing cycle groups' revenue month and primary month in order to estimate it's Seasonal Proration Adjustment. The Company's analysis of actual billing system data shows that Staff's assumptions are incorrect.

Furthermore, Staff assumed the relationship between each billing cycle groups' revenue month and primary month is the same across classes. However, the data shows these relationships change significantly across classes. The more Staff's assumption differs from the actual relationship, the greater the error in Staff's proposed Seasonal Proration Adjustment.

In order to completely understand the error, it is necessary to understand two billing system variables — the revenue month and primary month. The revenue month and primary month are two billing system variables defined for every customer's bill in every month. Unless otherwise stated, assume the state of the billing system being described is the state of the system prior to implementation of seasonal proration. We take this perspective because the adjustment is made to transform data that was generated prior to seasonal proration of billing units into data which reflects the existence of seasonal proration.

A customer's primary month variable is defined before a customer's bill is generated and determines whether the customer's usage is billed on winter or summer rates for the billing period. Imagine a customer who starts service in March. The primary month variable will be 3 for this customer's first bill. The primary month will increase to 4 for this customer's next bill, with absolute certainty, and will continue to increase by 1 for every bill until it reaches 12. At that point, the primary month variable resets to 1. If the primary month variable is 6, 7, 8, or 9 (corresponding to the months of June through September), then the customer is billed at summer rates, otherwise, they are billed at winter rates. The value of the primary month variable is not affected by the actual date on which the customers meter is read or bill is rendered. It is there to simply ensure that the customer is billed for 4 summer months and 8 winter months every 12 months, as required by the Company's rate schedules.

This function of the primary month is important because most customers are not billed on a calendar month basis. Rather, customers' bills reflect approximately 30-day periods (billing period) that have start dates staggered throughout the month and, therefore, span across two calendar months.[3] Therefore, a customer's bill may be based on usage in two calendar months, but the same bill has only one primary month value.

Seasonal proration of bills, which began after the test year in this case, changes the relationship between a customer's primary month variable and the bill calculation when a customer's billing period spans across a winter and a summer calendar month. In those billing periods, a customer will no longer be billed winter or summer rates based on the value of the primary month variable. Rather, the customer will be billed summer rates for some portion of their usage and winter rates for the remaining portion of their usage in the period.[4] The Seasonal Proration Adjustment proposed by Staff, and the one proposed by the Company, simulates the retroactive application of this change in billing practice to billing units determined under the primary month convention. In essence, the Seasonal Proration Adjustment is an attempt to transform primary month billing units into calendar month billing units.

Prior to this case, primary month data was transformed into calendar month data through the Days Adjustment. However, the Days Adjustment was implemented pro rata on an annual basis. Special attention was not given to mapping primary month winter and summer to calendar month winter and summer. The primary month based billing practice made this mapping unnecessary because primary months do not map direct to calendar months and billing/revenue collection was done on a primary month basis. Under seasonal proration,

[3] This reality is an artifact of a system set up to minimize total cost associated with labor necessary to physically read meters and infrastructure needed to render and send physical bills. Under that system, if the Company attempted to physically read all meters and render all physical bills at the end of every calendar month, then these labor and capital assets would need to be increased to meet the capacity of the instantaneous need for performing the operational need and then be idle for the remainder of the month.

[4] The portion which is billed for summer (winter) months is based on the number of days in the customer's billing period, which were calendar summer (winter) days. The fraction of days which are summer plus the fraction which are winter adds to 1, so the customer is billed for the correct total usage in the period.

primary months still do not map one-to-one to calendar months, but billing seasons, winter and summer, will map to calendar seasons.

Next, it is necessary to understand the revenue month billing system variable and its role in the Seasonal Proration Adjustment. First and foremost, it is necessary to know that primary month and revenue month are not necessarily equal to each other. While primary month is fixed before a bill is generated, the revenue month is determined by the point in time when a customer's bill is generated. The revenue month is defined for accounting purposes and determines the month to which revenue associated with a bill is booked as a receivable. Because there is a window of time in which a customer's usage can be metered and billed, there is uncertainty about the value of the revenue month variable prior to the point in time when a bill is generated. Therefore, there is uncertainty about the relationship between the value of a customer's primary month variable and the value of a customer's revenue month variable prior to the point in time when the customer's bill is generated. This is most relevant for customers whose billing window includes the transition between two revenue months. Nonetheless, the relationship between every customer's primary and revenue month variable values is observable after the fact. The pattern across billing cycle groups and rate classes is also quite predictable, although the relationship always has the potential to vary.

Q. Why is it important to know the relationship between customers' primary month and revenue month variables, when the Seasonal Proration Adjustment is, in essence, a transformation of primary month data into calendar month data?

A. It is necessary to understand this relationship, because the data used to develop weather normalized calendar month usage data is non-normalized revenue month usage data.

An intermediate output in the development of weather normalized calendar month usage data is weather normalized revenue month usage data.

However, the data used to calculate the normalized revenue needed to calculate the Company's necessary increase or decrease in revenue for ratemaking purposes is primary month usage data. Therefore, it is necessary to transform the weather normalized revenue month usage data into weather normalized primary month usage data prior to making the Seasonal Proration Adjustment. The difference between the weather normalized primary month usage data and the weather normalized calendar month data defines the appropriate Seasonal Proration Adjustment.

Q. How did Staff's assumptions about the relationship between primary month and revenue month variables lead to errors in its Seasonal Proration Adjustment?

A. Significant error is introduced into Staff's proposed Seasonal Proration Adjustment because Staff made assumptions about the relationship between customers' primary month and revenue month variables values that turn out to be incorrect. Staff made its assumptions at the bill cycle group level, which has some merit, but is unnecessary, and ultimately the assumptions were incorrect. An example helps to illustrate.

For the residential class, Staff assumed that bill cycle groups 1, 2 and 3 all had primary month equal to revenue month plus one. Let's assume we are looking at data for revenue month 5. Staff assumed that all kWh consumed by bill cycle groups 1, 2, and 3 in revenue month 5 had their primary month variable equal to 6 and were, therefore, charged at summer rates. It is also true in this example that all of those kWh were consumed prior to the start of calendar month 6. Accordingly, Staff's assumption results in the conclusion that all of these kWh were charged at summer rates under the primary month billing practice, but would be charged at winter rates under the seasonal proration billing practice. This would be the appropriate conclusion if it were true that the primary month is equal to revenue month plus one for all the customers in bill cycle groups 1, 2, and 3. However, the conclusion is flawed because this is not true. Ninety-nine percent of bill cycle group 3 customers have primary month equal to revenue month for revenue month 5, and every other month as well. Therefore, the revenue month 5 kWh consumed by bill cycle group 3 were not charged at summer rates and should not be part of the Seasonal Proration Adjustment. The same assumption fails on the other side of the seasonal cross over. In revenue month 9, Staff assumed all bill cycle group 3 customers have primary month equal to 10 and, therefore, that all of their revenue month 9 kWh usage was billed at winter rates under primary month billing, but will be billed at summer rates under seasonal proration. Again, Staff's assumption was incorrect, because 99% of bill cycle group 3 customers have primary month equal to 9 during revenue month 9 and, therefore, all of their kWh were billed at summer rates. These errors are not equal and offsetting and result in an aggregate adjustment for the Residential class that is inconsistent with the evidence and, therefore, is unsupported and unreasonable.

The impact of substantially correcting this one error can be calculated using Staff's workpaper. Staff's proposal for a Seasonal Proration Adjustment for the Residential class was $3,448,247. If we replace the assumption that 100% of bill cycle group 3 has primary month equal to revenue month plus one with the assumption that 100% of bill cycle group 3 has primary month equal revenue month, then the Staff's adjustment is reduced to $2,634,050, which is only about 25% greater than the revised adjustment calculated by the Company of $2,079,536.[5]

Q. Is there anything else wrong with Staff's adjustment method that explains more of the difference between the adjustments proposed by the Staff and those revised adjustments proposed by the Company?

A. Yes, the Staff, like the Company, first calculates a reallocation of kWh to summer and winter months. The Company then reallocates the kWh and multiplies the total seasonally adjusted billing units by current rates to get normalized revenues. The difference between that normalized revenue calculation and the one made in the prior step determine the Company's adjustment. On the other hand, Staff performs the seasonal proration adjustment analysis ad hoc outside of the normalized billing unit process, and therefore does not specifically reallocate kWh to seasons in a manner consistent with other billing unit adjustments. Because Staff does not perform this step, actually allocating the seasonally adjusted kWh to primary months in the development of billing units, it fails to multiply the seasonally adjusted kWh by current rates to see the impact on revenues. Instead, Staff simply takes the total number of kWh to be reallocated by its method and applies an assumed winter-summer rate differential. For example, Staff assumes the differential is 6 cents per kWh for the Residential class. The actual average realized difference between winter and summer rates is very close to 5 cents per kWh for the Residential. Replacing Staff's incorrect assumption of 6 cents per kWh with the actual realized difference of close to 5 cents per kWh results in a Staff adjustment of $2,195,041 – just

[5] The assumption that 100% of bill cycle group 3 has primary month equal to revenue month plus one is the same as an assumption that 0% of bill cycle group 3 has primary month equal revenue month. The data shows that 99% of bill cycle group 3 has primary month equal revenue month. We use the assumption of 100% because it is significantly closer to the truth, and easier to implement in Staff's model.

$115,685 above the Company's calculation. Some if not all of the remaining difference can be explained by other more minor imprecisions in the Staff's assumptions.[6]

The foregoing discussion demonstrates that the Company's revised Seasonal Proration Adjustment method uses the precise relationship between customers' revenue and primary month in every month to calculate a Seasonal Proration Adjustment based on the observed relationship and is superior to Staff's method which uses incorrect simplifying assumptions that lead to significant error in Staff's value.

Q. Are there any other specific examples of the errors outlined above that are noteworthy?

A. Yes, Staff makes the same revenue-primary month relationship assumption for the Small Primary Service Class as it did for the Residential class. The assumption again is that all customers in billing cycle group 1, 2, and 3 have primary month equal to revenue month plus one. This assumption is even farther from the truth for Small Primary Service billing cycle groups 1, 2, and 3 than it was for the same billing cycle groups in the Residential class. Staff then assumes all other billing cycle groups have primary month equal to revenue month. This is not the case, especially for billing cycle group 21. Almost 80% of billing cycle group 21 has primary month equal to revenue month minus one. Small Primary Service billing cycle group 21 is also among the largest billing cycle groups in the class.

[6] For the Residential class, these imprecisions include: 1) Staff assumed that 100% of bill group 1 and bill group 2 have primary month equal to revenue month plus one. This assumptions are very close to true, but not exactly true. The data show that approximately 99% of bill group 1 and bill group 2 have primary month equal to revenue month plus one. 2) Staff's assumptions for the remaining 18 billing groups are imprecise. The method proposed by the Company on the other hand is based on the precise relationship between revenue month and primary month for all customers. The Company performs the adjustment calculation using class level data, but the Company has also shown that the class level data is equal to the aggregate of the bill cycle level data and therefore captures the precise relationship that Staff has attempted to capture by performing their analysis at the bill cycle group level.

In Staff's analysis, kWh move in only one direction in the transformation of revenue month kWh to primary month kWh. However, in the case of Small Primary Service billing cycle group 21, kWh should move in the other direction. The first error moves too many kWh in one direction, and the second fails to move any kWh in the other direction when it should. These errors have a compounding effect on the total error in the analysis. Staff proposes an adjustment for the Small Primary Service class equal to $1,215,744 based on assumptions that are not supported by the data, while the Company's analysis proposes a $295,019 adjustment based on the relationship between revenue and primary month supported by the data. Something similar happens with the Large Primary Service class. Staff provides no analysis and proposes no adjustment, but the Company's analysis shows most kWh are consumed by customers with a primary month equal to the revenue month minus one. Similar to the case of Small Primary Service, kWh move the opposite direction during the conversion of revenue month data to primary month data. The result is actually a $40,923 downward adjustment to revenues in the Large Primary Service class associated with seasonal proration.

IV. STAFF'S METHOD FOR WEATHER NORMALIZING RESIDENTIAL BLOCK USAGE SUFFERS FROM MANY CONCEPTUAL AND LOGICAL ERRORS

Q. Please generally describe the data used by Staff to calculate the allocation of total Residential kWh usage to Block 1 and Block 2 usage.

A. Staff uses monthly bill count and total usage frequency tables provided by the Company to generate another frequency table which reorganizes the data based on the order the kWh were consumed by each customer. The two frequency tables provided by the Company include 1) bills counts and 2) total kWh usage each binned by the total kWh usage associated with a bill. More specifically, the data in the first two frequency tables was provided in 10 kWh bins. The first bin of the first table includes the number of bills for customers that consumed between 0 and 10 kWh. The first bin of the second table provides the total number of kWh consumed by all customers who consumed between 0 and 10 kWh, and so on. For the bin with limits of 500 and 510 kWh, the first frequency table provides the number of bills which were issued to customers who consumed more than 500 kWh but less than or equal to 510 kWh. The second frequency table provides the total number of kWh associated with customers who consumed between 500 and 510 kWh. To illustrate the relationship between the two frequency tables, assume there were 1,000 customers who consumed between 500 and 510 kWh. The 1,000 is the bill count. The total kWh associated with this bin must be between 1,000×500 = 500,000 and 1,000×510 = 510,000. This data can be used to develop a third frequency table with the same bins, but with the kWh expressed in different way. In the first frequency table, one might not expect to find too many bills with total consumption in the 0 to 10 kWh bin or 10 to 20 kWh bin because this is a unrealistic level of consumption for most active customers. However, one would expect to see a lot more bills and total kWh in the 500 to 510 kWh bin or the 1000 to 1010 kWh bin. In the third frequency table, the 0 to 10 kWh bin will necessarily be the largest. The 0 to 10 kWh bin is derived by adding all the kWh from the bills that terminate in the 0 to 10 kWh bin to 10 kWh from each bill which exceed 10 total kWh. The first number comes from the second table with the total kWh and the second number comes from multiplying the number of bills in all the bins above the 0 – 10 kWh bin from the first table by 10.

The same happens for the 10 to 20 kWh bin, with one additional step. All of the kWh from bills terminating in the 10 to 20 kWh bin minus the 10 kWh allocated to the first bin and 10 kWh from all the bills that exceed 20 total kWh are placed in the second bin. Although the limit on the bin is 20 kWh, 10 kWh are added for all bills that exceed 20 kWh, because 10 kWh from each of those bills were already allocated to the first bin. This continues until all kWh are allocated. Generally speaking, the kWh from bills terminating in each bin minus those allocated to lower bins are added to 10 kWh from all the bills which exceed the limit of the bin currently being constructed. The result is a frequency table in which kWh are binned based on the order they were consumed by customers. Bins are necessarily decreasing in size because a customer must necessarily consume the 100th kWh before they can consume the 101st kWh.

Q. What does Staff do with the ordered kWh frequency table?

A. The construction of the ordered kWh frequency table is tedious but tractable, and the frequency table itself is a logical mathematical object. However, the method Staff used to derive a weather normalized allocation of total kWh to Residential Block 1 and 2 from the ordered kWh frequency table suffers from several conceptual and logical flaws.

At a high level, Staff used the frequency table to identify the number of kWh that exist in the bin just above 750 kWh, the threshold which defines the first and second block of Residential usage in the winter months. In this specific case, Staff identifies the number of kWh in the bin with limits 750 and 760 kWh. Generally speaking, Staff moves some number of the kWh from this bin across the 750 kWh threshold. This movement of kWh across the threshold redefines the proportion of kWh above and below the 750 kWh threshold, and those proportions will be used to define the weather normalized allocation of total kWh to Block 1 and Block 2. Figure 1 provides a high level graphical illustration of Staff's process.

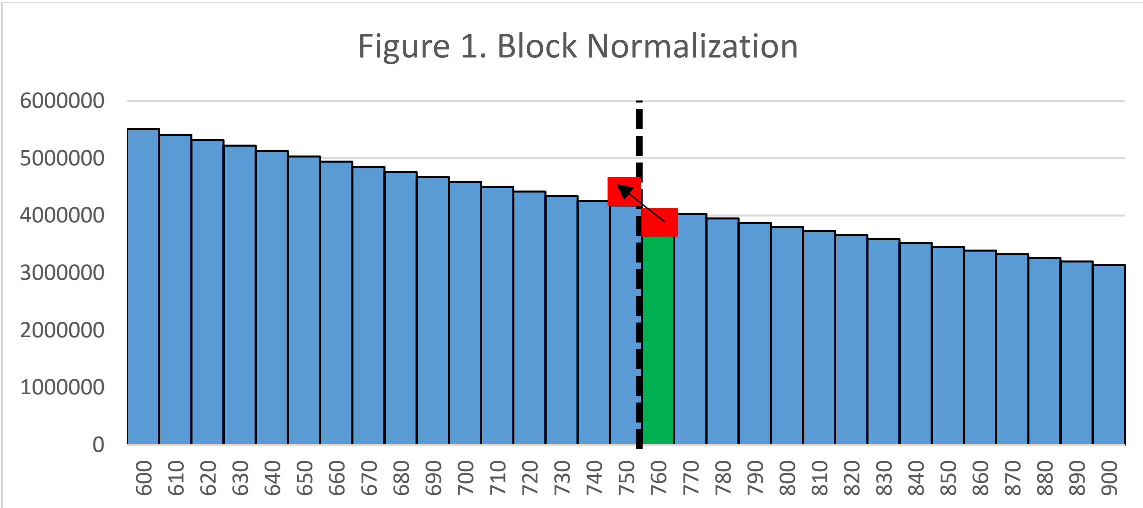


Figure 1. Block Normalization

The stacked green and red bar represent the total kWh in the bin between 750 and 760 kWh before the reallocation. The red block represents the portion of the kWh in that bin which will move across the line. The kWh in the red block is subtracted from the total of all bins to the right of the 750 threshold and added to the total of all kWh previously to the left of the threshold. The proportion of the total kWh on the left and the right after the red block has moved defines the weather normalized allocation of total kWh to Block 1 and Block 2.

On some level, this method appears to make sense. If the overall effect of weather normalization is a decrease in total kWh, then one would expect an overall increase in the proportion of kWh below the 750 threshold to increase. However, the logic used to accomplish the shift in proportion is flawed, does not resemble anything like weather normalization, and results in a shift with a magnitude which is arbitrary. At the highest level, the method does not resemble weather normalization because the total number of kWh across the whole frequency table does not change, i.e. the frequency table is not weather normalized. Instead, Staff's method simply moves some kWh from one side of the threshold to the other side to change the relative proportion of kWh on each side. The challenge associated with analyzing the flaws of this method is the method's complexity. However, complexity is not the same thing as accuracy, and even at a high level, it is clear that Staff's method does not actually reflect weather normalization.

Q. Are there other high level conceptual flaws in Staff's method?

A. In addition to the high level logical flaw described above, there is another, slightly more specific, high level conceptual flaw which raises questions about the soundness of the method. Now, instead of assuming there is a decrease in total kWh as a result of weather normalization (as would happen in a winter month that was colder than normal), assume there is an increase in total kWh (as would happen in a winter month that was warmer than normal). One should expect the proportion of kWh in Block 1 to decrease as a result of this increase in total kWh. In this case, one might imagine that Staff looks at the bin to the left of the threshold, the 740 to 750 kWh bin, and moves some kWh from it over to the right side of the threshold.[7] But that is not what Staff does. Instead, Staff continues to look at that bin on the right side of the threshold, and calculates a number of kWh to move using the bin on the right side of the threshold. Staff then moves that number of kWh, a number associated with the bin on the right of the threshold, from the left side of the threshold to the right side of the threshold. This illustrates a lack of attention to conceptual clarity in the method employed by Staff to weather normalize Residential Block 1 and Block 2 kWh and how Staff's method arbitrarily chooses the magnitude of the shift.

[7] In the case of a decrease in total kWh, which corresponds to an increase in the Block 1 proportion, Staff moved some kWh from the block on the right of the threshold to the left.

Q. Are there any other conceptual flaws in the Staff's method of allocating weather normalized kWh to Residential Blocks 1 and 2?

A. Yes. Setting aside for a moment the general and specific flaws described above, there is an additional, independent flaw in the computation of the number of kWh that move across the threshold.

There are a large number of terms included in the calculation of the number of kWh that will move across the threshold and the resulting weather normalized Block 1. Those terms include the ratio of 750 to the weather normalized average kWh per customer, the ratio of 750 to the observed average kWh per customer, the ratio of 760 to the observed average kWh per customer, the proportion of kWh on the left side of the 750 kWh threshold, and the proportion of kWh in the 750 to 760 kWh bin. The relevance of some of these terms to a calculation of this nature is not clear.

Nonetheless, the terms can be combined in the manner they are combined by Staff and simplified to derive a generalized expression of the method for computing the number of kWh that will move across the threshold and the resulting weather normalized Block 1. The resulting expression is shown below.

$$NormBlock1 = A + 75 \times [(1/WF) - 1] \times B$$

NormBlock1 is Staff's weather normalized proportion of kWh in Block 1. *A* is the proportion of kWh in Block 1 prior to weather normalization. *B* is the proportion of kWh in the 750 to 760 kWh bin prior to weather normalization. *WF* is the weather normalization factor used to weather normalize total kWh. It is worth noting, this is done for each winter month, so these are monthly proportions and weather factors.[8] While the weather normalization factor was not explicitly entered as a term in the method, it appears as a result of the simplification. For clarity, the weather normalization factor is the ratio of the average weather normalized kWh usage per customer to the average actual test year kWh usage per customer, depicted as follows:

$$WF = \frac{Avg\ Weather\ Normalized\ kWh\ per\ Cust}{Avg\ Actual\ kWh\ per\ Cust}.$$

Furthermore, $[(\frac{1}{WF}) - 1] = \frac{Avg\ Actual\ kWh\ per\ Cust - Avg\ Weather\ Normalized\ kWh\ per\ Cust}{Avg\ Weather\ Normalized\ kWh\ per\ Cust}$. This term can be interpreted as a percentage difference between the actual kWh usage and the weather normalized usage.

From that point of view, $[(\frac{1}{WF}) - 1] \times B$ represents something like the number kWh of *B* that are different from what would exist in a normalized *B*, assuming the weather normalization factor applicable to the entire distribution is also applicable to this very specific block. This is also a questionable assumption made by Staff, but we will ignore it for now to address another flaw in the method.

Now, there are two points which raise concern about this method. First, why is the difference between the original *B* and a normalized *B* the right number of kWh to move across the threshold? If anything, this value tells one how we might expect *B* to change as a result of weather normalization, but it is not clear why moving this number of kWh across the threshold somehow results in new proportions on either side of the threshold that are normalized for the

[8] While NormBlock1, A, and B are expressed in terms of the proportion of total kWh, I will refer to them as number of kWh at times. Thinking about these variables in terms of numbers of kWh is often simpler conceptually, requires less words to express, and does not undermine any of the logic. If both sides of the expression were multiplied by the total number of kWh, then we would have the number of kWh associated with the proportions, and the method would deliver the same result. The kWh version of NormBlock1 would just need to be divided by the total kWh at the end to provide the proportional value Staff uses to allocated total weather normalized kWh to the two blocks.

effect of weather. In fact, all of the other bins remain unchanged by the normalization process, and the total number of kWh remains the same. This is the same as the general concern raised above, but here it can be seen in the context of the specific number of kWh that will move across the threshold.

Second, why is this number multiplied by 75? One answer: This is simply the mathematical result of combining all the terms in Staff's method. Another answer: This is the result of the location of the threshold and the size of the bins. In that sense, it is the number of bins to the left of the threshold. It is worth noting that the number of bins to the left of the threshold has nothing to do with the number of kWh in any of those bins.

Knowing that it is the number of bins to the left of the threshold could lead one to attempt to rationalize why it is a sensible factor, but it is not. The method is always exclusively looking at the bin to the right of the threshold, and the number of kWh in that bin has nothing to do with the number of bins on the left of the threshold. Also, sometimes kWh are moved from the right side of the threshold to the left side of the threshold. What does the number of bins on the left side of the threshold tell us about the number of kWh in the bins on the right side of the threshold that should be moved to the left? The answer is nothing. Even if one is moving kWh from the left to the right of the threshold, the number of bins does not have anything to do with the number of kWh on the left. The factor would stay the same even if the number of kWh on the left doubled. The number 75 or the number of bins to the left of the threshold does not provide any information about the data in the frequency table, and therefore provides no information about the number of kWh which should be moved across the threshold. The idea of simply moving things across the threshold while leaving the total unchanged as a method for weather normalization is questionable at best, and scaling the amount moved in one bin by 75 is entirely arbitrary. It is possible that the 75 is an artifact of the lack of clarity in the development of the method, rather than conscious choice made by the developer. That explanation seems as likely as any other.

Q. What is the main conclusion of your analysis?

The Staff's method should not be used to calculate the weather normalized proportion of total Residential kWh that are allocated to Block 1 and Block 2 because it does not actually weather normalize the data that determine those proportions. Instead, the method shifts an arbitrary number of kWh across the threshold that defines the blocks and calls those block weather normalized.

On the other hand, the Company uses statistical methods to estimate the relationship between the proportion of kWh in Block 1 and weather using historical data. Then, the Company calculates the weather normalized proportion of kWh in Block 1 for the test year using that estimated relationship and normal weather. The method is simple and straightforward, and most importantly, it is a coherent method for weather normalizing the proportion of kWh in Block 1 and 2.

In the current case, the Staff's method for weather normalizing Residential blocks allocates 30,138,554 more kWh to Block 1 than the Company's method. Given the differential between the blocks is $0.0266 per kWh, the Staff's method over estimates normalized Residential revenue by $801,686. The analysis of the impact of Staff's method is included as Schedule NSB-R1.

More importantly, the Staff's method results in an arbitrary reallocation of kWh to Residential Block 1 and 2. In any given case, the method could result in an allocation to Block 1 that is greater or less than the Company's weather normalized allocation. The important thing to understand is that Staff's method results in an allocation based on an arbitrary shift of kWh. The arbitrary nature of the shift is the reason to reject the Staff's allocation, not the specific outcome in this case.

V. STAFF'S MEEIA ANNUALIZATION ADJUSTMENT

Q. Did Staff make any modifications in the course of calculating its MEEIA Annualization Adjustment?

A. Yes, Staff removed some of the savings associated with programmable thermostats from annualized MEEIA savings in the course of developing its MEEIA Annualization Adjustment. If a household purchased more than two thermostats through the Company-sponsored program, then Staff removed the thermostats and savings associated with thermostats for all the thermostats in excess of two per household.

Q. Do you agree with the thermostat modification Staff made to the MEEIA Annualization Adjustment?

A. I view the thermostat modification made by Staff to the MEEIA Annualization Adjustment as a kind of pro forma adjustment to the deemed savings which are currently available for calculating the MEEIA Annualization Adjustment. The Company expects to replace deemed savings values with evaluated savings at the time of the true-up. When deemed savings are replaced with evaluated savings, then this type of pro forma adjustment Staff made should be eliminated completely because it will not be necessary.

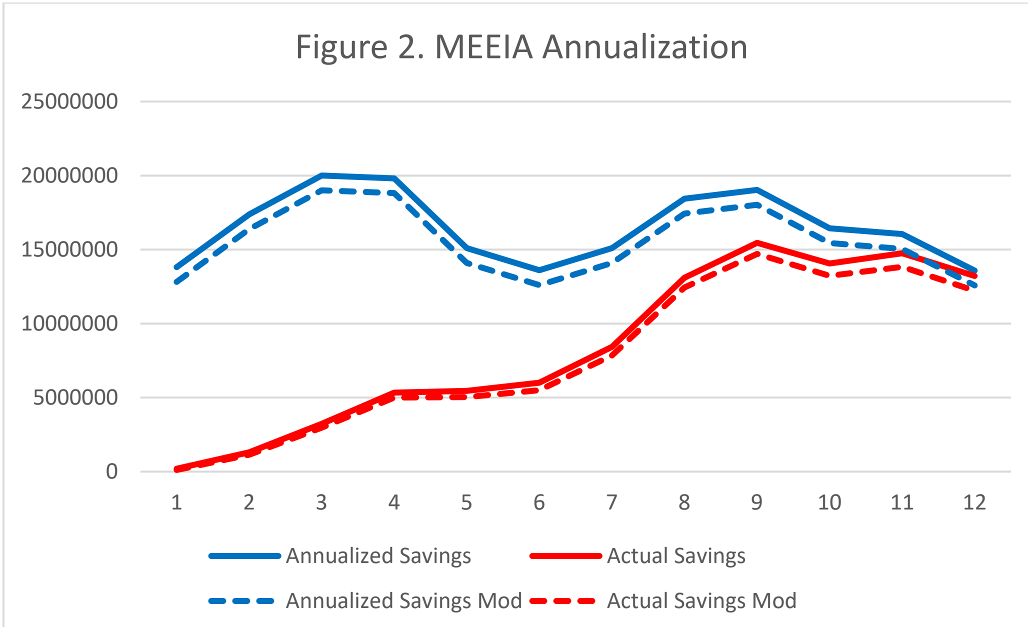
Q. Did you identify any errors in Staff's calculation of the thermostat modification?

A. Yes. Assuming Staff's proposal to make a modification is reasonable, its execution of the modification was in error. The MEEIA Annualization Adjustment is the result of combining two measures of the savings associated with Company sponsored MEEIA programs. The two measures are the annualized value of the savings and the actual test year value of the savings.

The annualized value of savings is the value of the savings associated with all test year energy efficiency measures going forward into the future. Another way to conceptualize the annualized savings is that the annualized savings is the savings that would have occurred during the test year if all energy efficiency measures were installed on the first day of the test year. The actual test year value of savings is the value of the savings that actually occurred in the test year given energy efficiency measures were installed at different times throughout the test year.

The MEEIA Annualization Adjustment is calculated by taking the difference between the annualized value of savings and the actual test year value of savings. The reason is that the actual savings occurred in the test year and are, therefore, already reflected in billing units, but the Company expects to experience the annualized value of savings in the future. Therefore, the MEEIA Annualization Adjustment removes the difference between these two measures of savings from billing units to arrive at billing units the Company expects in the future given the energy efficiency measures will continue to affect future billing units.

The Staff erred in its modification. Staff removed savings related to the thermostats in its adjustment from the annualized value of savings but failed to remove those savings from the actual test year savings value. Figure 2 provides a graphical illustration of the elements involved in Staff's error. Energy efficiency savings are on the vertical axis and months are on the horizontal axis.



The two solid lines reflect the annualized and actual savings without Staff's modification across a twelve-month period. The vertical difference between the two solid lines represents the MEEIA Annualization Adjustment in any month. The blue dotted line represents Staff's modified annualized savings. The red dotted line represents the modification Staff should have, but did not, made to actual test year savings. The vertical difference between the two dotted lines would represent a correctly calculated modified MEEIA Annualization Adjustment. However, Staff failed to remove savings from the actual savings values and, therefore, calculated the difference between the dotted blue line and the solid red line. This failure is reflected in the fact that Staff's calculation of the MEEIA Annualization Adjustment includes negative values at the end of the series. Instead of recognizing and correcting their error, Staff replaced the negatives with zeros instead. While removing the negatives made the error less obvious, a critical analysis of Staff's calculation reveals the error exists along the entirety of the series.

In order to quantify the impact of the error, the Company assumed that 1/12 of the energy efficiency investments Staff removed from the annualized savings were made in each month. The Company then removed the associated savings from Staff's estimate of actual savings. The result was an approximate decrease of 2.8 million kWh in actual savings and, therefore, an increase of 2.8 million kWh in the MEEIA Annualization Adjustment.

Q. Are there any other errors in Staff's calculation of the MEEIA Annualization Adjustment?

A. Yes. Staff failed to appropriately implement the half-month convention in its calculation of annualized savings and test year actual savings. MEEIA savings reports provide total monthly savings for energy efficiency investments made within a month. However, using that total monthly savings number in the month those savings are reported is the same as assuming all the energy efficiency investments happened on the first day of the month. This is an extreme assumption, and, in contrast, the Company uses a half-month convention to better reflect that energy efficiency investments occur across the entire month, which better reflects the timing of actual savings. The half-month convention allocates half of the total savings associated energy efficiency investments made in a month to the month they are made. The other half of the savings is allocated to the next month. This assumption is the same as assuming the energy efficiency investments were distributed evenly across all days in the month.

Staff attempted, but erred in its implementation of the half-month convention, because Staff included one half-month of savings associated with investments made in the month preceding the test year, and excluded one half-month of savings associated with investments made in the last month of the test year. If this error is corrected within Staff's calculation and the thermostat modification is removed, then Staff's annualized savings is only approximately 0.18% different from the Company's calculation of annualized savings.

The setup of Staff's model makes it difficult to make the correction to annualized and actual savings at the same time. Instead of projecting the value of annualized savings by month into the future based on test year investments, Staff simply sums the values in test year months to get the annual total of annualized savings. An estimate of the impact of the correction to annualized savings can be derived by eliminating the values in the month prior to the test year and wrapping half of the last month of the test year around into the first. This allows the Company to estimate the impact of correctly implementing the half-month convention on annualized savings, but simultaneously corrupts the value of the actual savings.

However, the Company can unwind the correction to the annualized savings calculation, thus returning the actual test year savings, and eliminate the thermostat adjustment. If this is done, then Staff's estimate of actual savings is approximately 0.12% different from the Company's calculation of the actual savings. If the two corrected values are stored while making the corrections independently, and then the difference is taken, Staff's corrected MEEIA Annualization Adjustment is only approximately 0.25% different from the Company's MEEIA Annualization Adjustment.

Q. Did Staff inappropriately omit any savings that should have been included in the MEEIA Annualization Adjustment?

A. Yes, Staff omitted MEEIA 2 Long Lead project savings that should have been included in the MEEIA Annualization Adjustment.

Q. Did Staff properly reflect the exclusion of home energy reports from the MEEIA Annualization Adjustment?

A. No. While it is true that home energy report savings are excluded from MEEIA Annualization Adjustments, Staff incorrectly removed savings associated with programs that should be included in the MEEIA Annualization Adjustment along with savings associated with home energy report savings.

In the past, the only savings reported under the home building shell category of energy efficiency savings were home energy report savings. This is no longer the case and the home building shell savings category now includes savings from other programs that should be included in the MEEIA Annualization Adjustment. Staff, in an attempt to remove home energy report savings, removed all home building shell savings. In doing so, Staff removed some savings that should have been included in the MEEIA Annualization Adjustment along with those that should have been removed for home energy reports.

Home energy reports are interesting in this case for another reason. The home energy report program is ending at the end of 2021. Due to the timing of the end to home energy reports and this case, an oddity in the rebasing of the throughput disincentive exists. There is an opportunity to correct the oddity associated with home energy reports in this case. The fact that the Home Energy Report savings are excluded from the annualization adjustment is a reflection of the unique and complex nature of this program. Savings from the program are assumed to have a relatively short persistence. We do not annualize their effect in the test year because that effect will not necessarily continue indefinitely into the future when new rates take effect. In light of this, the normal practice of not normalizing the effects is appropriate.

In this case, that normal practice is complicated by the pending termination of the program. It is also worth noting that a program of this nature - personalized customer communications intended to encourage behavior changes that save energy - will continue to be provided by the Company but outside of the MEEIA program framework. The Company has rolled out a new usage presentment and bill comparison tool in conjunction with its Time of Use rate program that provides customers with the same type of information. So in reality, the savings from the program are likely to persist but outside of the MEEIA framework. In recognition of that fact, along with the end of the program itself, the Company suggests annualizing the effect of home energy reports in this case and immediately terminating recovery associated with the program through the MEEIA throughput disincentive mechanism. This would accomplish two things. First, it would recognize the ongoing effect of behavior modification that should arise from the Company's new usage presentment tool, and it would also avoid a significant complication in managing a complex program through the throughput disincentive mechanism, which is better suited to energy efficiency measures with persistent ongoing savings.

VI. SOLAR ADJUSTMENT

Q. Did Staff make a Solar Annualization Adjustment?

A. No, Staff did not adjust billing units to account for decreased usage that will occur due to behind the meter solar installations funded by the Company's Solar Rebate program. The Solar Annualization Adjustment is similar conceptually to the MEEIA Annualization Adjustment. Retail customers install behind the meter solar generation and receive a solar rebate from the Company. The Company uses the interconnection date of behind the meter solar generation to determine the annualized value of behind the meter solar generation and the actual test year solar generation. As with energy efficiency programs, the actual test-year solar generation is already reflected in test-year billing determinants but, going forward, the Company expects to have reduced billing determinants equal to the annualized value of the behind the meter solar generation. Therefore, the Company reduces billing units by the difference between the two to reflect this additional expected decrease in billing units. Staff has made a similar adjustment to billing units in the past based on the known and measureable level of behind the meter solar generation but failed to complete such an adjustment in this case.

VII. RIDER EDI DISCOUNTS

Q. Do you agree with the Rider EDI discount adjustment proposed by Staff?

A. I agree with one of the principles outlined by Staff for calculating Rider EDI discount adjustments, but I disagree with the specific way the Rider EDI discount adjustment calculation was made in this case.

Q. What is the Rider EDI discount adjustment principle with which you agree?

A. I agree with Staff's recommendation that Rider EDI discounts be annualized. For instance, if a Rider EDI customer began to receive EDI discounts after eight months of the test year period had already passed, then the total of the four monthly discounts observed in the test year period should be scaled to reflect discounts that would be expected over twelve months.

In the example above, one could simply multiply the total EDI discounts observed over four months by twelve over four. This is equivalent to assuming the discount in the other eight months without observed discounts would be equal to the average of the observed monthly discounts.

Given the Rider EDI discounts are available for five years, it is reasonable to assume that contracts which began during the test year will be applicable in each of the twelve months of a year, and for years following the conclusion of the case in which the annualization is made.

Q. Why do you disagree with Staff's specific calculation of the Rider EDI Adjustment in this case?

A. Staff made a conceptual or computational error in its calculation of the annualized value of the Rider EDI discount. Specifically, Staff used the sum of a customer's monthly discounts for the twelve months ending December 2020, but the count of the number of discounts the customer received during the sixteen months ending April 2021.

For example, one customer began to receive Rider EDI discounts in February 2020 and received discounts for eleven months by the end of the twelve months ending December 2020. By the end of the sixteen months ending April 2021, the same customer had received Rider EDI discounts for fifteen months. In this instance, there are at least three reasonable ways to calculate an expectation of the discounts this customer would receive in a twelve-month period.

First, the sum of the eleven monthly discounts received during the twelve months ending December 2020 could be multiplied by twelve over eleven.

Second, the sum of the fifteen monthly discounts received during the sixteen months ending April 2021 could be multiplied by twelve over fifteen.

Third, the sum of the twelve monthly discounts received during the twelve months ending April 2021 could be used directly.

Staff did not choose any of these three options. Instead, Staff multiplied the eleven monthly discounts received during the twelve months ending December 2020 by twelve over fifteen. This same conceptual or computational error was made for each Rider EDI customer.

Q. Did the Company calculate an updated EDI Discount Adjustment?

A. Yes, the Company's updated calculation of the Rider EDI Discount is included as Schedule NSB-R2. The annualized discount was calculating using Rider EDI Discount data for the twelve months ending April 2021. If an account had 12 months of data, then the actual discount observed in those months is used. If an account had less than 12 months of data, than the discount is annualized by multiplying the sum of the discounts by twelve over the number of months a discount was received. Effectively, the average observed discount is used in months where no discount existed.

VIII. RATE SWITCHING AND LARGE CUSTOMER NORMALIZATION ADJUSTMENT

Q. Are there any inconsistencies in Staff's Rate Switching and Large Customer Normalization Adjustments?

A. Yes. There is one customer that switches from the Small Primary Service to the Large Primary Service class during the updated test year period, the 12-months ending April 2021. This customer switched classes in April of 2021. Staff increased Large Primary Service billing units for all 12 months of the updated test year period to reflect the expectation that this customer will remain in the Large Primary Service class going forward. Specifically, Staff increased the customer count, energy, demand and reactive demand billing units in the Large Primary Service class for the 11 months the customer was not in the Large Primary Service class to reflect this expectation. However, Staff made a significantly different adjustment to the Small Primary Service class. Staff removed the same customer count and energy billing units from the Small Primary Service Customer class as it added to the Large Primary Service class but did not remove any demand or reactive power billing units. The revenues associated with reactive power are relatively small but could and should be removed from the Small Primary Service class for the sake of consistency. The revenues associated with demand are significant. In the one month that this customer was classified as Large Primary Service, the customer registered a demand of 5,364 kW. That demand was registered in April, a winter month. Staff adjusted Large Primary Service revenues by adding 5,364 kW to the remaining 11 months of the test year, 7 winter months and 4 summer months. The current Large Primary Service demand charges are $8.58 per kW in winter and $19.27 per kW in summer. The demand portion of this increase in Large Primary Service billing units results in a $735,619 increase in Large Primary Service revenue. There is no offsetting decrease in Small Primary Service revenue for the same period. The customer was a Small Primary Service customer in those 11 months and their demand billing units are included in Staff's Small Primary Service calculation of normalized revenues. Small Primary Service demand charges are $1.69 per kW in winter and $4.65 per kW in summer. If we multiply the actual demand registered by this customer during the 11 months the customer was a Small Primary Service customer, then revenue associated with this customer is $134,278. This amount of revenue should be removed from the Small Primary Service class, because this customer's demand is added to demand used to calculate normalized revenue in the Large Primary Service class.

Q. Please provide a summary of the errors made by other parties related to the calculation of normalized revenues.

A. A summary of the errors made by other parties, in terms of their effects on normalized revenues are provided in Table 1.

Table 1. Summary of Adjustment Errors (in dollars)				
Party	**Adjustment**	**Proposed Adjustment**	**Corrected Adjustment**	**Error**
MIEC	**Residential Revenue**	12,500,297	0	12,500,297
MIEC	**SGS Adjustment**	17,979,477	0	17,979,477
Staff	**SGS Seasonal Proration Adjustment**	1,140,878	624,643	516,235
Staff	**LGS Seasonal Proration Adjustment**	3,003,100	1,682,703	1,320,397
Staff	**SPS Seasonal Proration Adjustment**	1,215,744	295,019	920,725
Staff	**LPS Seasonal Proration Adjustment**	0	-40,923	40,923
Staff	**LGS Seasonal Proration Adjustment**	-81,119	-198,864	117,745
Staff	**SPS Seasonal Proration Adjustment**	-84,558	-109,583	25,025
Staff	**Residential Block Normalization Adjustment Error**	801,686	0	801,686
Staff	**Residential MEEIA Adjustment**	-8,856,724	-9,633,484	776,760
Staff	**SGS MEEIA Adjustment**	-1,719,892	-2,000,974	281,081
Staff	**LGS MEEIA Adjustment**	-3,000,888	-3,224,058	223,169
Staff	**SPS MEEIA Adjustment**	-811,445	-971,620	160,174
Staff	**Residential Solar Adjustment**	0	-469,534	469,534

Staff	**SGS Solar Adjustment**	0	-132,622	132,622
Staff	**LGS Solar Adjustment**	0	-91,076	91,076
Staff	**SPS Solar Adjustment**	0	0	0
Staff	**LPS Solar Adjustment**	0	-25,190	25,190
Staff	**Residential Seasonal Proration Adjustment**	3,448,247	2,079,536	1,368,711
Staff	**Rate Switching Adjustment Error**	134,278	0	134,278
MIEC	**Total Error**	30,479,775	0	30,479,775
Staff	**Total Error**	-4,810,694	-12,216,026	7,405,332

IX. COMMUNITY SOLAR PILOT CUSTOMER FEEDBACK

Q. Did Staff make any specific recommendations related to the existing Community Solar Pilot Program?

A. Yes. Staff recommended that the Company collect information from customers who exit the Community Solar Pilot Program on their reason for exiting the program. The Company sought to clarify Staff's recommendation by submitting Data Request ("DR") 847 to Staff. The DR specifically asked if the Company adding a question to the un-enrollment (exit) process would satisfy its recommendation. Specifically, the Company would add a drop-down type request for "reason leaving the program" to the un-enrollment process. Staff responded to the DR with an affirmative "yes."[9] The Company is not opposed to adding this type of data collection functionality to its un-enrollment process for the Community Solar Pilot Program.

[9] Staff's response to DR 847 is attached as Schedule NSB-R3.

Q. Does this conclude your rebuttal testimony?

A. Yes, it does.

Update Period Rider EDI Discounts																
EDI Customer	**202005**	**202006**	**202007**	**202008**	**202009**	**202010**	**202011**	**202012**	**202101**	**202102**	**202103**	**202104**	**Test Year Total**	Number of Months in Test Year	Average Monthly Value	Annualized Value
3M	-2,639.18	-5,205.21	-1,990.84	-8,124.67	-6,546.24	-3,708.73	-4,652.35	-4,566.75	-5,093.15	-6,551.20	-5,306.64	-5,469.17	-59,854	12	-4,988	-59,854
3M	-582.53	-1,671.60	-2,169.47	-2,301.98	-2,316.44	-961.73	-1,097.58	-961.96	-1,023.23	-999.13	-999.13	-1,072.10	-16,157	12	-1,346	-16,157
3M				-8,756.56	-8,513.40	-3,677.27	-3,651.23	-4,232.04	-6,080.93	-6,489.22	-4,819.62	-3,908.71	-50,129	9	-5,570	-66,839
4M	-6,202.52	-11,996.97	-14,527.33	-15,366.68	-15,359.59	-7,720.01	-6,649.49	-6,735.78	-6,550.71	-5,768.75	-6,444.72	-6,260.85	-109,583	12	-9,132	-109,583
3M												-4,577.30	-4,577	1	-4,577	-54,928
3M												-90.56	-91	1	-91	-1,087
Class Totals	**202005**	**202006**	**202007**	**202008**	**202009**	**202010**	**202011**	**202012**	**202101**	**202102**	**202103**	**202104**				-308,447
3M	-3,221.71	-6,876.81	-4,160.31	-19,183.21	-17,376.08	-8,347.73	-9,401.16	-9,760.75	-12,197.31	-14,039.55	-11,125.39	-15,117.84	-130,808			
4M	-6202.52	-11996.97	-14527.33	-15366.68	-15359.59	-7720.01	-6649.49	-6735.78	-6550.71	-5768.75	-6444.72	-6260.85	-109,583			
EDI Total	**202005**	**202006**	**202007**	**202008**	**202009**	**202010**	**202011**	**202012**	**202101**	**202102**	**202103**	**202104**				
Total	-9424.23	-18873.78	-18687.64	-34549.89	-32735.67	-16067.74	-16050.65	-16496.53	-18748.02	-19808.3	-17570.11	-21378.69	-240,391			

Annualized Rider EDI Discounts													
EDI Customer	**202005**	**202006**	**202007**	**202008**	**202009**	**202010**	**202011**	**202012**	**202101**	**202102**	**202103**	**202104**	**Test Year Total**
3M	-2,639.18	-5,205.21	-1,990.84	-8,124.67	-6,546.24	-3,708.73	-4,652.35	-4,566.75	-5,093.15	-6,551.20	-5,306.64	-5,469.17	-59,854
3M	-582.53	-1,671.60	-2,169.47	-2,301.98	-2,316.44	-961.73	-1,097.58	-961.96	-1,023.23	-999.13	-999.13	-1,072.10	-16,157
3M	-5,569.89	-5,569.89	-5,569.89	-8,756.56	-8,513.40	-3,677.27	-3,651.23	-4,232.04	-6,080.93	-6,489.22	-4,819.62	-3,908.71	-66,839
4M	-6,202.52	-11,996.97	-14,527.33	-15,366.68	-15,359.59	-7,720.01	-6,649.49	-6,735.78	-6,550.71	-5,768.75	-6,444.72	-6,260.85	-109,583
3M	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-4,577.30	-54,928
3M	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-90.56	-1,087
Class Totals	**202005**	**202006**	**202007**	**202008**	**202009**	**202010**	**202011**	**202012**	**202101**	**202102**	**202103**	**202104**	
3M	-13,459.46	-17,114.56	-14,398.06	-23,851.07	-22,043.94	-13,015.59	-14,069.02	-14,428.61	-16,865.17	-18,707.41	-15,793.25	-15,117.84	-198,864
4M	-6202.52	-11996.97	-14527.33	-15366.68	-15359.59	-7720.01	-6649.49	-6735.78	-6550.71	-5768.75	-6444.72	-6260.85	-109,583
EDI Total	**202005**	**202006**	**202007**	**202008**	**202009**	**202010**	**202011**	**202012**	**202101**	**202102**	**202103**	**202104**	
Total	-19661.97667	-29111.52667	-28925.38667	-39217.75	-37403.53	-20735.6	-20718.51	-21164.39	-23415.88	-24476.16	-22237.97	-21378.69	-308,447

Schedule NSB-R1

		202005	202006	202007	202008	202009	202010	202011	202012	202101	202102	202103	202104
Staff	**Total Weather Factor**	0.9454	0.9527	0.9370	0.9702	1.0431	0.9918	0.9755	1.0545	1.0573	0.9753	0.9415	1.0731
Staff	**Block 1 Weather Factor**	0.7474					0.7322	0.7108	0.5557	0.4324	0.4479	0.5150	0.6736
Staff	**Block 2 Weather Factor**	0.2526					0.2678	0.2892	0.4443	0.5676	0.5521	0.4850	0.3264
Company	**Total Weather Factor**	0.9853	0.9667	0.9437	0.9846	1.0361	0.9800	0.9932	1.0651	1.0540	0.9453	0.9778	1.0470
Company	**Block 1 Weather Factor**	0.7395					0.7172	0.6968	0.5401	0.4317	0.4782	0.4999	0.6683
Company	**Block 2 Weather Factor**	0.2605					0.2828	0.3032	0.4599	0.5683	0.5218	0.5001	0.3317
Difference	**Block 1 Weather Factor**	0.0080	0.0000	0.0000	0.0000	0.0000	0.0150	0.0140	0.0156	0.0007	-0.0303	0.0151	0.0053
Company	**Total kWh**	782,032,524	968,100,930	1,289,545,595	1,325,127,522	1,238,216,281	812,347,819	835,151,992	1,163,540,875	1,565,201,566	1,401,416,727	1,236,622,853	854,061,397
Difference	**Block 1 kWh**	6,218,292	0	0	0	0	12,185,776	11,700,070	18,186,563	1,097,572	-42,480,630	18,698,572	4,532,339

Total Difference in Block 1 kWh
30,138,554

Block Rate Differential
0.0266

Total Impact on Revenues
801,686

Schedule NSB-R2

Missouri Public Service Commission

Respond Data Request

Data Request No.	0847
Company Name	MO PSC Staff-(All)
Case/Tracking No.	ER-2021-0240
Date Requested	9/22/2021
Issue	General Information & Miscellaneous - Other General Info & Misc.
Requested From	Jeff Keevil
Requested By	Teneisha Perry
Brief Description	Class Cost of Service
Description	Please refer to Staff's Class Cost of Service Report, at page 71, Staff witness Amada Coffer's recommendation regarding tracking un-enrollment information for the Community Solar Pilot. Would collecting feedback from customers leaving the Community Solar program or waitlist by adding a drop-down query ("Reason for Cancelling Subscription") to the customer un-enrollment process provide the recommended information?
Response	Yes. DR Response provided by Amanda Coffer (amanda.coffer@psc.mo.gov).
Objections	NA

The attached information provided to **Missouri Public Service Commission** Staff in response to the above data information request is accurate and complete, and contains no material misrepresentations or omissions, based upon present facts of which the undersigned has knowledge, information or belief. The undersigned agrees to immediately inform the **Missouri Public Service Commission** if, during the pendency of Case No. **ER-2021-0240** before the Commission, any matters are discovered which would materially affect the accuracy or completeness of the attached information. If these data are voluminous, please (1) identify the relevant documents and their location (2) make arrangements with requestor to have documents available for inspection in the **MO PSC Staff-(All)** office, or other location mutually agreeable. Where identification of a document is requested, briefly describe the document (e.g. book, letter, memorandum, report) and state the following information as applicable for the particular document: name, title number, author, date of publication and publisher, addresses, date written, and the name and address of the person(s) having possession of the document. As used in this data request the term "document(s)" includes publication of any format, workpapers, letters, memoranda, notes, reports, analyses, computer analyses, test results, studies or data, recordings, transcriptions and printed, typed or written materials of every kind in your possession, custody or control or within your knowledge. The pronoun "you" or "your" refers to **MO PSC Staff-(All)** and its employees, contractors, agents or others employed by or acting in its behalf.

Security :	Public
Rationale :	NA

Schedule NSB-R3

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

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

AFFIDAVIT OF 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 *Rebuttal Testimony*; and further, under the penalty of perjury, that the same is true and correct to the best of my knowledge and belief.

/s/ Nicholas Bowden
Nicholas Bowden, PhD

Sworn to me this 15th day of October, 2021.