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March 21, 2023

via hand-delivery

Steve Kahl, Executive Secretary
North Dakota Public Service Commission
600 E. Blvd. Ave. Dept. 408
Bismarck, ND 58505-0480

Re: Montana-Dakota Utilities Co., Case No. **PU-22-194**

Attached are an original and seven copies of the **Surrebuttal Testimony of Ron Nelson** in the above referenced matter.

Please feel free to contact me with any questions or concerns.

Sincerely,

TSCHIDER and SMITH

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Prefiled Surrebuttal Testimony of Ron Nelson
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**CERTIFICATE OF SERVICE**

I hereby certify that the original and seven (7) copies of the foregoing was hand delivered/mailed/emailed, on this 21st day of March, 2023 to the following:

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BEFORE THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

| | | |
|---|---|---|
| **Montana-Dakota Utilities Co.** | ) | **Case No. PU-22-194** |
| **2022 Electric Rate Increase Application** | ) | |

**Surrebuttal Testimony of**

**RON NELSON**

**on behalf of**
**AARP**

March 21, 2023

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## I. INTRODUCTION

**Q. Please state your name, title, and position.**

A. My name is Ronald Nelson. I am a Senior Director at Strategen Consulting located at 10265 Rockingham Dr. Suite #100-4061, Sacramento, CA 95827.

**Q. On whose behalf are you testifying?**

A. I am testifying on behalf of AARP.

**Q. Are you the same Ron Nelson who submitted direct testimony in this proceeding?**

A. Yes.

**Q. What is the purpose of your surrebuttal testimony?**

A. My surrebuttal responds to the cost of service, revenue apportionment, and rate design issues raised in the rebuttal testimony of the MDU consultant, Witness Ronald J. Amen. Specifically, I maintain that, as recommended in my direct testimony:

- the Commission should apply the basic customer approach as a basis for informing rate design and revenue apportionment;
- the Company's approach to revenue apportionment should cap increases to the revenue requirement for any given class at 20% and limit increases to classes above parity to 90% of the system average increase; and,
- the Commission should reject MDU's proposal to dramatically increase its residential basic customer charge and maintain the current charge of $0.46/day.

## II. COST OF SERVICE STUDY

### A. <u>The Influence of Economic Incentives on Cost of Service Studies</u>

**Q. Please summarize the position you took in your Direct testimony regarding the influence of economic incentives on cost of service studies.**

A. In Direct, I noted that a utility's economic incentives can influence the numerous subjective determinations that are made during a COSS. For example, a utility would typically prefer to shift costs away from groups that are more responsive to price increases such as commercial and industrial (C&I) customers, and as the availability of third-party substitutes has accelerated, a utility "may take actions to make their services more cost competitive through otherwise inefficient rate design changes."[1]

**Q. Does MDU Witness Ronald J. Amen respond to your testimony regarding how economic incentives can influence the subjective determinations that are made during cost of service studies?**

A. Yes. The MDU consultant claims that "determining cost causation is as simple as asking the question of whether a particular cost changes when some potential allocation factor changes" and, as an example, claims that some portion of conductor costs are driven by customers while some other portion is driven by non-coincident peak demand.[2] The MDU consultant claims further that although the process of cost causation is "straightforward," other parties may attempt to bias the results of a COSS in order to lower the revenue requirement for the customer(s) represented by that party.[3] In contrast, according to the Witness, "[t]he utility has no reason to favor one group over another and seeks to match cost causation with rates."[4] According to the Witness, a utility client has never explicitly "requested that [the Witness] pursue a particular cost of service construct that would preserve or enhance the client's bottom line."[5] Finally, the MDU consultant claims that my

[1] Nelson Direct at 7
[2] Amen Rebuttal at 12
[3] Amen Rebuttal at 12
[4] Amen Rebuttal at 13
[5] Amen Rebuttal at 11

testimony "provides no evidentiary support, authoritative sources, or examples to support [my] conclusions about price elasticity of demand across customer classes or the impact of third-party competitive services that are specific to Montana-Dakota's recovery of its costs of providing electric utility service or its bottom line."[6]

**Q. How do you respond to the MDU consultant's rebuttal regarding the subjective determinations made when conducting a COSS?**

A. By noting that other intervenors may recommend alternative decisions during the COSS process, the MDU consultant appears to implicitly acknowledge that a COSS involves subjective determinations. I interpret the Witness' claim that "[t]he utility has no reason to favor one group over another," combined with the criticism of other parties, to suggest that the Witness finds the utility to be the only party capable of objective decision-making. Simply, utilities are not neutral observers. Like any business, utilities are obligated to produce financial returns for their shareholders, in fact, a fiduciary duty: indeed, one of the reasons that utilities are subject to regulation is that they are monopolies whose obligations to shareholders may not necessarily align with the public good.

My testimony provided examples of ways that utilities also have biases, as described above. These biases are not specific to North Dakota but are a natural result of the fact that an investor-owned utility is a profit-seeking enterprise. Because a utility's infrastructure investments are the source of its profits, a utility would prefer not to lose sales – whether due to competition from third party services or because customers respond to price increases – that could lessen or defer the need for infrastructure

[6] Amen Rebuttal at 11

investment. Utilities may favor C&I customers not only because they are more responsive to price, but because each customer represents more revenue than a smaller customer. This is evidenced by the creation of economic development tariffs to attract large power customers to service territories as well as dedicated energy manager positions to provide customer service to larger customers. C&I customers are also typically more sophisticated than smaller customers and may have greater resources to invest in energy efficiency, distributed resources, and other demand-side solutions that could threaten a utility's sales.

The examples that I provided are not only a natural result of a utility's profit incentives, but are supported by extensive research. For example, a NERA Economic Consulting report includes a literature review of several studies that estimate the price elasticity of demand associated with a given customer class. The long-run price elasticities of demand for residents ranged from -0.32 to -0.98, while the industrial classes price elasticities of demand ranged from -0.56 to -3.36. The NERA report's findings also indicate that commercial and industrial demand is generally more elastic than residential demand.[7] In addition, a recent National Resources Research Institute article details several actions that utilities have historically taken to make their services more competitive while increasing inefficiencies for customers as the availability of third-party substitutes has accelerated.[8] If the MDU consultant believes that utilities,

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[7] *See*: Agustin J. Ros, An Econometric Assessment of Electricity Demand in the United States Using Panel Data and the Impact of Retail Competition of Prices, June, 2015. NERA Economic Consulting. Accessible at: http://www.nera.com/content/dam/nera/publications/2015/PUB_Econometric_Assessment_Elec_Demand_US_0615.pdf

[8] *See*: Carl Pechman, "Regulation and the Monopoly Status of the Electric Distribution Utility," *NRRI Insights* (June 2022). Available at: pubs.naruc.org/pub/B284311B-1866-DAAC-99FB-C52B7A570087

unlike other profit-seeking enterprises, do not respond to profit incentives, no evidence has been provided to support this assertion.

### B. The Basic Customer and Minimum System Approaches

**Q. Please summarize the position you took in your direct testimony regarding the basic customer and minimum system approaches to classifying distribution system costs.**

A. In direct, I demonstrated that the basic customer approach to classifying distribution system costs more accurately reflects cost causation and is less subjective than the minimum system approach. This is because from an engineering perspective, the distribution system is designed to meet localized peak demand of a group of customers, and from an economic perspective demand reflects how the system is utilized by customers. Similarly, it is a customer's demand that causes the fixed costs of the distribution system, not simply the numerical addition of that customer to the system. I also demonstrated that the basic customer approach is supported by reliable references including NARUC, Regulatory Assistance Project (RAP) publications, and Bonbright's *Principles of Public Utility Rates*, and cited several states that have ruled explicitly that customer charges should reflect only the costs typically associated with the basic customer approach – including states where North Dakota's electric utilities have a presence, such as Colorado and Texas. In contrast, minimum system studies, which may be conducted using either the minimum size or zero-intercept methods, are the least reasonable because they require the analyst to create a hypothetical, no capacity system that does not really exist or reflect system characteristics – a process that involves making numerous subjective assumptions that oversimplify system engineering and assign costs based on questionable cost causative principles. ND PSC staff have previously agreed that there is "no theoretical or practical justification"[9] for the minimum system method and argued that FERC accounts 364-368 should "be classified as wholly demand-related with no customer-related component."[10] I noted that the Company did not justify its decision to use the minimum size approach for FERC Accounts 364-367, even though according to NARUC, "comparative studies between the minimum-size and other methods show that it generally produces a larger customer component than the zero-intercept method."[11] As described in Section II.c of my surrebuttal, I also noted that in addition to theoretical flaws, MDU's minimum system study suffers from several extremely problematic computational flaws.

**Q. How did the MDU consultant respond to your testimony on the theoretical basis for the basic customer and minimum system methods?**

A. According to the MDU consultant, the Regulatory Assistance Project (RAP), which authored one of the references that I cited, is funded by advocates of clean energy adoption and public policy that encourages distributed generation. One of the RAP report's authors has long maintained a position on the basic customer method that aligns with my own. In addition, the MDU consultant notes that the NARUC manual states that FERC accounts 364-368 have both a demand and customer component, and "does not even mention the sole allocation of upstream distribution facilities on demand as an alternative for classifying and allocating distribution plant."[12] The Witness provides an

[9] *See*: In the Matter of the Application of Northern States Power Company for Authority to Increase Rates for Electric Service in North Dakota, Docket No. PU-20-441, Direct Testimony of Karl R. Pavlovic at 13 (Apr. 23, 2021), available at https://psc.nd.gov/database/documents/20-0441/090-010.pdf
[10] In the Matter of the Application of Northern States Power Company for Authority to Increase Rates for Electric Service in North Dakota, Docket No. PU-20-441, Direct Testimony of Karl R. Pavlovic at 15 (Apr. 23, 2021), available at https://psc.nd.gov/database/documents/20-0441/090-010.pdf
[11] NARUC Electric Manual at 91
[12] Amen Rebuttal at 16

exhibit listing several utilities that classify varying degrees of FERC accounts 364-368 as customer-related, and cites an Indiana Utilities Regulatory Commission order approving a utility's use of a minimum system study in its rate case. Finally, the Witness explains that MDU applied the minimum size rather than the zero-intercept method to FERC accounts 364-367 because the Company did not have the data necessary to conduct a zero-intercept study, and that it was thus "not a subjective decision to not use the zero-intercept analysis."[13]

**Q. Does the MDU consultant address the arguments you made in direct regarding why the basic customer approach is more theoretically sound than the minimum size approach?**

A. No. In fact, the MDU consultant's rebuttal reinforced my position that the basic customer approach is theoretically superior to the minimum system approach. The Witness provides a list of several utilities that have classified components of their distribution system as customer-related to "varying degrees."[14] This variance cited by the MDU consultant is a prime example of one of my concerns about the minimum system approach: in order to analyze an imaginary system, a minimum system study requires making numerous subjective determinations that oversimplify system engineering and assign costs based on questionable cost causative principles. Furthermore, the Witness does not address the methodologies employed across the different states, which I can say with certainty (having testified in 15 states on related issues) vary greatly and to an unreasonable extent. A different analyst will make different determinations, resulting in a

[13] Amen Rebuttal at 18
[14] Amen Rebuttal at 16

wide variance in classification of customer costs as cited by the Witness. In contrast, the basic customer approach is far less subjective and reflects actual system realities.

Due to this apparent agreement with my criticism, the MDU consultant does not address the substance of this argument, but rather attempts to discredit it by focusing on the policy preferences of a selection of RAP's funders. I offer no comment on RAP's funding sources, which are not at issue in this proceeding. The analysis provided in the RAP manual speaks for itself and, regardless of one's policy preferences, reflects a reality: MISO and other RTOs are rapidly evolving to reflect higher penetrations of renewable resources. My direct testimony provided examples of how failure to adapt COSS and rate design to reflect this new reality could be quite costly for customers.[15] The 2020 RAP manual thus provides additional guidance that is more pertinent to modern power system trends than the NARUC manual, which was published in 1992.

**Q. Do you agree that the NARUC manual "does not even mention the sole allocation of upstream distribution facilities on demand as an alternative for classifying and allocating distribution plant?"[16]**

A. No. The NARUC manuals are inconsistent on this topic and mention 100% demand classification of distribution in several places. As noted in my direct testimony, the NARUC Electric Manual methods discusses a method similar to the Basic Customer

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[15] In my Direct testimony, I noted the that in the April 2022 Planning Resource Auction for Planning Year 2022-2023, capacity prices in MISO's Northern and Central region increased to $236.66/MW-day (the Cost of New Entry), as compared to $5/MW-day the prior year. This dramatic jump in prices is thought to be attributable to the decrease in accredited capacity as coal plants were replaced by variable solar and wind, as well as the increase in electricity demand as the region recovers from COVID-19. This is a clear indication of how increased renewable penetration has increased the value of load flexibility and that failure to adapt to this reality by incentivizing load flexibility could be quite costly. (See: Ethan Howland, "Capacity prices jump across MISO's central and northern regions, driven by supply shortfall," *Utility Dive* (April 18, 2022). www.utilitydive.com/news/capacity-prices-auction-miso-midcontinent/622186)

[16] Amen Rebuttal at 16

Approach in the marginal cost section on pages 136–146. The NARUC Gas Manual discusses the Basic Customer approach on page 23.

**Q. Did the MDU consultant's explanation of why the Company conducted a minimum size study rather than a zero-intercept study for FERC accounts 364-367 address your concerns?**

A. No. The Witness' explanation simply indicates that MDU did not maintain the data needed to conduct a zero-intercept study for FERC accounts 364-367. The Company's failure to maintain adequate records is not a reasonable justification for using a methodology that impacts customers by resulting in higher customer charges. As detailed in the subsequent section, this is not the only issue that resulted in higher customer charges – whether through subjective determinations, computational errors, or failure to maintain records, the Company's methodology inflated customer charges at nearly every step of the minimum system process.

### C. <u>Analysis of MDU's Minimum System Study</u>

**Q. Please summarize the computational problems with MDU's minimum system study as cited in your direct testimony.**

A. In Direct, I demonstrated that:

- MDU's inclusion of primary distribution system components in the minimum system study contradicts cost causation theory.
- MDU did not follow the instructions of the NARUC Electric Manual. The Company's minimum size study uniquely involved modeling a miniature, hypothetical system – a step not mentioned by NARUC that provides additional opportunities for error and for which the Company did not justify its assumptions when asked. In addition, when

conducting its zero-intercept study on transformers, the Company's decision to include in its calculation of customer costs transformers that exceed NARUC specifications inflates customer-related costs because the zero-intercept cost for three phase transformers is substantially higher than that of their single-phase counterparts.

- MDU uses an inappropriate and misleading measure of the cost of each minimum-sized component of its distribution system.

**Q. How did the MDU consultant respond to the first issue, that the Company's inclusion of primary distribution system components in the minimum system study contradicts cost causation theory?**

A. According to the Witness, this issue "amounts to a nomenclature difference. Montana-Dakota classifies all conductor upstream of the connection to the line transformer as Primary. Most of the poles in the distribution system carry multiple conductors, both single and three phase, and different voltage levels. Normal operating voltage is 12.47/7.2 kV (not high voltage). The only conductor classified as Secondary is the line from the pole to the transformer and from there to the service drops. Secondary voltage downstream of the transformer is 120V to 240V."[17]

**Q. Did the MDU consultant address your concern regarding the Company's inclusion of primary distribution system components in its minimum system study?**

A. No. My central concern remains that, after conducting its minimum size analysis, "MDU applied its customer-related cost ratio to primary distribution system costs, which is equivalent to claiming that adding individual customers is the root cause behind the costs associated with primary distribution."[18] The Witness' response appears to selectively

[17] Amen Rebuttal at 18
[18] Nelson Direct at 24

focus on normal operating voltages, but does not dispute my central concern. It is laughable and illogical to suggest that a 34,000-volt primary distribution line is driven by the number of customers, as a high-voltage line would be required to serve the peak loads of 100 or 25,000 customers alike. Because the Company's COSS does not distinguish between primary and secondary systems, I am not able to verify how this issue impacted customer-related costs. However, given the cost of high voltage lines, it likely results in millions of dollars being inappropriately classified as customer-related.

**Q. How did the MDU consultant respond to the fact that the Company did not follow the steps outlined in the NARUC manual because the Company added an additional step of modeling an imaginary, miniature system?**

A. The MDU consultant does not appear to respond to this concern directly. The Witness repeats the description of the Company's modeling approach as described in Direct, and notes that the process involved consulting with distribution engineering personnel and compiling data from real construction projects. The Witness also reiterated the belief that the Company's modeling approach represented a realistic proxy for its distribution system and claimed that my use of the terms "hypothetical" and "imaginary" to describe the systems that analysts must create to conduct a minimum system study are "overused" and "grossly inappropriate," respectively.[19]

**Q. Did the MDU consultant's rebuttal address your concern regarding the Company's decision to stray from NARUC instructions by modeling a miniature, one-mile system?**

[19] Amen Rebuttal at 19

A. No. The Company could have used its rebuttal as an opportunity to allay my concerns that modeling a miniature system, a step not recommended by NARUC, may have involved assumptions that do not necessarily reflect system realities or introduced opportunities for error. For instance, the Company could have justified the specific assumptions involved in its analysis as requested previously and provided an analysis indicating that its deviation from NARUC recommendations yielded results that are consistent with what would have been produced had NARUC specifications been followed. Instead, the Company simply restated its approach of modeling a miniature system that it believes is representative. The MDU consultant criticizes my use of the terms "hypothetical" and "imaginary" to describe the system analyzed under its minimum system approach while simultaneously reiterating that, because the Company's analysts strayed from NARUC specifications by creating a miniature system that does not exist, the system modeled by the Company is in fact both hypothetical and imaginary.

I repeat that that the NARUC Electric Manual's methodology is meant to represent cost causation. Not following the methodology, therefore, will result in estimates that do not reflect cost causation, as theorized by the NARUC Electric Manual.

**Q. How did the MDU consultant respond to the fact that when conducting its zero-intercept study on transformers, the Company decided to include transformers that exceed NARUC specifications in the calculation of the customer component, unreasonably inflating customer-related costs?**

A. According to the Witness, the Company included transformers that exceed NARUC specifications due to the small sample size and reran the study using NARUC parameters. "The resulting customer component impact was negligible, less than 5%. The resulting cost per residential customer, per month was $.18, and does not provide a rationale for rejecting a customer component for transformers."[20]

**Q. Did the MDU consultant's rebuttal address your concern regarding the Company's decision to use transformers that exceed NARUC specifications?**

A. No. The Witness did not provide any support for its claim that following NARUC parameters for transformers would result in impacts of less than 5% – a claim which appears to be incorrect. Since the Company has not shown its work, I am not able to verify where the Company erred in its calculation. Given the focus on sample size, I presume that the Company is focusing only on the first step of a zero-intercept analysis, in which a regression is conducted. There is also a second step, in which the total cost of hypothetical, zero load transformers is divided by the total cost of all transformers to yield the percentage of customer-related costs. Had the Company followed NARUC specifications throughout each step of the zero-intercept study, it would see that the impact is far greater than 5%.

In addition, the MDU consultant's claim that deviation from NARUC specifications on classifying transformer costs "does not provide a rationale for rejecting a customer component for transformers" mischaracterizes my position. It is not one isolated issue but a confluence of factors – including several computational flaws and a lack of theoretical support –that leads to my position that the basic customer approach is a superior methodology that is less subjective and more accurately reflects cost causation.

**Q. How did the MDU consultant respond to your concerns regarding the Company's decision to use current rather than historic costs for FERC accounts 364-368?**

[20] Amen Rebuttal at 22

A. The Witness notes the importance of using consistent dollars when conducting a minimum system study to facilitate an apples-to-apples comparison. In addition, the MDU consultant claims that a cited passage of the RAP manual recognizes the indexing of costs to current dollars, though no such claim exists in the passage cited. Finally, the Witness cites a passage from Doran et al's *Electric Utility Cost Allocation Manual* that suggests "the use of reproduction costs" when conducting a zero-intercept analysis.[21]

**Q. Do you dispute the importance of using consistent dollars to facilitate an apples-to-apples comparison when conducting a minimum system study?**

A. No.

**Q. Did the MDU consultant's rebuttal address your concern regarding the Company's decision to use current rather than historic costs when conducting a minimum system study?**

A. No. The NARUC manual notes that plant balance – historic, not current costs – is used when determining the customer to demand ratio.[22] If consistent dollars are to be used, this would require using historic costs when calculating the customer-related component as well. The Witness has provided a citation suggesting that "reproduction costs" be used when conducting a zero-intercept analysis, though no such citation is provided for a minimum size study. If other sources suggest alternatives to the approach recommended by NARUC, this indicates only that the Company's decision to use current costs is subjective and supported by nothing other than internal judgement – even though such

[21] See: Amen Rebuttal at 21-22
[22] *See*: NARUC Manual at 90-94

determinations can have large impacts on the amount of costs deemed customer-related. The basic customer approach has no such subjectivity.

## III. REVENUE APPORTIONMENT

**Q. Please summarize your recommendations regarding revenue apportionment.**

A. In Direct, I recommended that revenue apportionment be informed by the results of the Company's COSS using the basic customer approach, that the maximum increase to any class be capped at 20%, and that the increase to classes above parity be limited to 90% of the system average, or 12.5%.

**Q. How did the Company respond to your proposal?**

A. The MDU consultant opposes my proposal as it is based on the basic customer approach rather than the Company's minimum system study, which the Witness favors. In addition, the Witness claims that I did not "provide a common definition of rate shock or what circumstances give rise to it" and disagrees with my assertion that the proposed revenue increase is quite substantial and would lead to rate shock, claiming that "'rate shock' in the utility industry has been a convenient phrase to use as rationale for opposing large over-all utility revenue increases. Its use is often controversial and rarely defined in terms of numerical boundaries."[23]

**Q. Has the MDU consultant addressed your concerns regarding the serious theoretical and computational flaws in the Company's minimum service study?**

A. No.

**Q. Has the MDU consultant demonstrated that the basic customer approach is <u>not</u> a less subjective alternative that better reflects cost causation?**

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[23] Amen Rebuttal at 37

A. No.

**Q. Did the MDU consultant address your concerns regarding the proposed 35% maximum revenue increase?**

A. No. I did not offer a precise definition of rate shock. The Witness notes not seeing numerical boundaries to define rate shock. However, the Witness fails to realize the reason no such boundaries exist – it is because rate shock occurs on a spectrum, not on absolute terms. For example, larger rate increases result in greater rate shock, while lower increases lead to less rate shock. This explanation of rate shock explains why the Witness has never seen numerical boundaries – because it would be inappropriate and would misunderstand the concept of rate shock. Regardless of the definition, a 35% revenue increase for any customer is high.

## IV. RATE DESIGN

**Q. Please summarize your recommendations regarding rate design?**

A. In Direct, I recommended rejecting the Company's proposal to increase the residential basic customer charge. I found that, because the Company's proposal is based on its highly flawed minimum system study, it does not reflect cost causation. In addition, the Company's proposal would harm low usage customers who also tend to be low-income as well as those investing in distributed generation, lacks support, and does not send price signals that align with the needs of an evolving power grid, which may necessitate increased cost recovery through time-varying volumetric charges.

**Q. How did the Company respond to your concerns regarding its proposal to increase the residential customer charge?**

A. The MDU consultant agrees that the power grid is evolving but claims that "[d]emand related fixed costs should be recovered in demand based kW fixed charges, both for cost recovery and providing the proper price signal to customers," and cites several examples of time-varying demand charges.[24] The Witness claims that "[i]n Mr. Nelson's imaginary electric utility world all costs, other than those that reside in his Basic Customer method, seem to be variable," and cites a section of the RAP manual also indicating that modern COSS approaches have increased temporal cost allocation.[25] According to the Witness, this contemporary approach to COSS that reflects evolving grid conditions "turns cost of service on its head, undermining cost causation principles that have laid the foundation for cost of service analyses for decades and renders the NARUC Manual to forced obsolescence."[26] The Witness claims further that "[t]he inclusion of fixed costs in the variable charge sends an inaccurate economic price signal to customers" that "overstates the value of energy consumption and understates the costs necessary to be able to provide service regardless of how much energy the customer uses."[27] Finally, the Witness argues that the proposed customer charge increase should not be included as a low-income bill impact consideration, and cites a study on low income customers that did not discuss customer charges. Instead, the cited report suggests that TOU programs may harm low-income customers.

**Q. Do you agree that "fixed costs" should be recovered through fixed charges in order to align cost recovery with cost causation?**

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[24] Amen Rebuttal at 40
[25] Amen Rebuttal at 41
[26] Amen Rebuttal at 43
[27] Amen Rebuttal at 43

A. No. The Company's categorization of electric system costs as "fixed" and "variable" does not contemplate many characteristics of the modern and future power system and reflects a gross oversimplification of cost classification. The application of the fixed and variable premise over-emphasizes short-term costs, and therefore utility revenue collection, and de-emphasizes long-term asset avoidance and overall system efficiency.[28]

In the modern power system, traditional fixed and variable costs no longer serve these set purposes and will not reflect cost causation if categorized as such for rate design. For example, wind and solar facilities would traditionally be considered fixed investments with very little, to no, variable cost. Informing rate design through the fixed and variable paradigm may lead to recovering wind and solar resources completely through system demand charges. However, utilities often invest in wind and solar to avoid fuel costs, which are traditionally considered variable. By furthering the legacy concept of fixed and variable cost categorization, the Company allows itself to carry over historic rate design structures that less effectively serve the modern power grid.

The growing need for storage serves as another example. Historically to fill capacity gaps, utilities had to build large centralized, dispatchable generation. With the rise of intermittent renewables, storage and smaller scale generation can be procured to fill more precise grid services – for instance, energy storage can be procured to fill a four-hour capacity need. This is a significant change to resource planning as it demonstrates the value of increasingly granular (e.g., time variant) grid service definitions.

**Q. In addition to reflecting cost causation, does volumetric revenue recovery also send superior price signals to incentivize load flexibility?**

[28] See Linvill, et. al. Smart Non-Residential Rate Design Optimizing Rates for Equity, Integration, and DER Deployment at 20.

A. Yes. When compared to volumetric time-varying rates, demand charges – even time-varying demand charges, as discussed by the MDU consultant – do not send as comparatively granular price signals to incent customers to modify their behavior to flexibly address system needs when the system is under stress. Demand charges function such that, once a customer has set high monthly demand within a given TOU window, that level of demand acts as a ceiling and the demand charge fails to provide an incentive to lower demand below the threshold set earlier in the month. Volumetric TOU rates, in contrast, always provide a strong incentive to manage demand throughout the month and during each TOU period. Incenting customers to modify their behavior to become grid resources when the system typically operates at higher and lower costs creates a significant value to both the customer and system.

**Q. Do you agree that increasing time-varying volumetric recovery "turns cost of service on its head?"**

A. No, and the MDU consultant has not explained why he believes this to be the case. This claim is puzzling given that the Witness also appears to advocate for time-varying demand charges. Creating time-varying demand charges requires analysis of time-varying costs, with volumetric energy costs a common area of focus for such an analysis. The MDU consultant does not appear to propose another approach.

Increasing volumetric cost recovery does not turn cost analysis on its head, but can better reflect cost causation and incentive grid flexibility in a power system marked by increasing penetrations of variable, renewable resources, where costs are increasingly time-varying. Inaccuracy is exacerbated by flat rates, not by increasing volumetric cost recovery. Given the increasing penetration of renewable energy on MDU's system, increasing fixed charges and decreasing volumetric cost recovery would be moving in the wrong direction.

**Q. Did the MDU consultant's rebuttal ease your concerns that increasing the customer charge would disproportionately harm low-income customers?**

A. No. The MDU consultant's entire argument appears to be that a single report identified by the Witness does not include a discussion regarding how increasing customer charges harms low-income customers. I presume that the Witness chose not to respond to the evidence that I presented in direct because it speaks for itself: MDU's own data shows that low-usage customers would be disproportionately impacted by the proposed customer charge increase and EIA data demonstrates that low-usage utility customers across the country also tend to be low-income.[29]

**Q. Do TOU programs harm low-income customers?**

A. The data on this topic is not conclusive. One recent Brattle Group study found that low and moderate income (LMI) customers responded to TOU signals nearly as much as other customers and that on average, all customers on the TOU rates (including LMI customers) benefited from bill savings of 5% to 10%.[30] Potential low-income bill impacts can be addressed by studying pilot results before rolling out to all customers or making participation in a TOU tariff optional.

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[29] *See*: Nelson Direct at 36-38, citing: MDU Response to AARP 1-10; National Consumer Law Center Analysis of U.S. EIA 2015 Residential Energy Consumption Survey Data. In: John Howat, John T. Colgan, Wendy Gerlitz, Melanie Santiago-Mosier, and Karl R. Rábago, "Reversing Energy System Inequity: Urgency and Opportunity During the Clean Energy Transition," p. 2. https://www.nclc.org/wp-content/uploads/2022/08/report-reversing-energy-system-inequity.pdf; National Energy & Utility Affordability Coalition, "North Dakota By the Numbers." https://neuac.org/wp-content/uploads/2021/02/North-Dakota-State-Sheet-2022.pdf

[30] https://www.brattle.com/insights-events/publications/study-by-brattle-economists-evaluates-time-of-use-tou-pilots-for-maryland-utilities/; https://www.brattle.com/wp-content/uploads/2021/05/19973_pc44_time_of_use_pilots_-_year_one_evaluation.pdf

## V. SUMMARY OF RECOMMENDATIONS

**Q. Could you please provide a summary of your recommendations for the Commission?**

A. Yes. I recommend that:

- the Commission apply the basic customer approach as the basis for informing rate design and revenue apportionment;
- the Company's approach to revenue apportionment should also:
  - cap increases to the revenue requirement at 20% for any class; and
  - limit increases to classes above parity to 90% of the system average increase;
- the Commission should reject MDU's proposal to dramatically increase its residential basic customer charge.

## VI. CONCLUSION

**Q. Does this conclude your rebuttal testimony?**

A. Yes.