COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF KENTUCKY-	)	
AMERICAN WATER COMPANY FOR A	)	CASE NO.
CERTIFICATE OF PUBLIC CONVENIENCE AND	)	2025-00240
NECESSITY FOR INSTALLATION OF	)	
ADVANCED METERING INFRASTRUCTURE	)	

DIRECT TESTIMONY

OF

LARRY W. HOLLOWAY, P.E.

ON BEHALF OF

KENTUCKY OFFICE OF ATTORNEY GENERAL

OCTOBER 1, 2025

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LARRY W. HOLLOWAY, P.E.

Introduction and Overview

Introduction and Qualifications

Q. Please state your name and address

A. My name is Larry W. Holloway, and my address is 6856 Lake Ridge Parkway, Ozawkie, Kansas 66070.

Q. On whose behalf are you testifying in this case?

A. I am an independent utility consultant testifying on behalf of the Kentucky Office of the Attorney General (OAG").

Q. Please state your experience and qualifications.

A. While my resume is provided as Exhibit LWH-1, I will provide a brief description of my experience and expertise as it relates to this proceeding. I have over 45 years of engineering and management experience, mostly in the operation and regulation of electric and gas utilities. I have broad experience in electric generation facility design, construction, testing, operations, maintenance, and planning. My engineering experience includes project management of electric utility transmission and generation construction, as well as process equipment and facilities in an inorganic chemical plant. I am familiar with the design and operation of a variety of processes and equipment and have overseen design, construction, maintenance, engineering, operations, and preoperational

and performance testing of a variety of raw, treated, and demineralized water, steam and power systems in nuclear power plants. I have experience in reviewing, critiquing and implementing utility projects for design selection, project management, and overall costs in regulatory proceedings. Over the past thirty years, I have provided testimony in over 50 proceedings before state regulatory commissions, over 40 as a member of the Kansas Corporation Commission[1] Staff, and the remainder as an independent regulatory consultant or on behalf of a Kansas municipal energy agency.

I have a Bachelor of Science degree in Civil Engineering, a Bachelor of Science degree in Mechanical Engineering and a Master of Science degree in Mechanical Engineering from the University of Kansas. I have a Master of Engineering Management degree from Washington State University. In addition, I am a registered Professional Engineer in Mechanical and Civil Engineering. My career includes experience as a field engineer for a natural gas utility, a project engineer for an inorganic chemical plant, 12 years of experience in the construction, startup and operation of nuclear power plants, 16 years as a section chief for the Staff of the Utilities Division of the Kansas Corporation Commission, and 16 years as a member of the management team of a small municipal energy agency in Kansas.

Q. Have you ever testified before the Kentucky Public Utilities Commission (the "Commission")?

A. Yes. I sponsored testimony in Case Nos. 2012-00535, 2013-00199, 2016-00370 and 216-00371.

[1] The Kansas Corporation Commission ("KCC") is the Kansas utilities commission.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to review the Application of Kentucky American Water Company ("KAW") for a Certificate of Public Convenience and Necessity ("CPCN") to deploy Advanced Metering Infrastructure ("AMI").[2] Specifically, I address the following:

Summary of Conclusions and Recommendations

Q. What are your conclusions regarding KAW's AMI implementation plan?

A. KAW's AMI implementation plan to replace its existing inventory of Automatic Meter Reading ("AMR") capable meters with AMI capable meters over a 10-year time frame, when the existing AMR meters are removed and replaced due to failure or at the end of service life, appears to be a reasonable approach to avoid early retirements and costs of removing metering that is used and useful.

Q. What are your conclusions regarding KAW's AMI Cost Benefit Analysis ("CBA")?

A. KAW provided a CBA that looked at the difference between continuing to use AMR capable meters and the AMI implementation plan to deploy AMI meters over a 10-year period. AMI and AMR meter pricing was updated and current, and other assumptions were consistently applied to both cases. AMI benefits were conservatively calculated, and in fact other possible AMI benefits were not considered, possibly underestimating these benefits. While the implementation plan assumes AMI deployment over a 10-year period, KAW uses a 20-year period to account for one-time costs and benefits that differ during years 11 through 20. I believe this approach is not unreasonable. While KAW did not

[2] See the Application filed in Case No. 2025-00240 on July 11, 2025 ("Application").

consider and evaluate a rapid deployment case for AMI, it is unlikely that that case would compare favorably with the AMI implementation plan as described.

Q. What are your recommendations?

A. The results of the CBA show that implementation of AMI is not the least cost option with an expected additional net present value of costs net benefits of $[redacted]/month per customer. This is a relatively small increase in costs. The Commission should consider if the additional benefits that were not quantified, and possible qualitative and future benefits that were not considered justify KAW's AMI plan as proposed.

Overview of the Application

Q. Can you describe your understanding of the proposal?

A. Yes, KAW is proposing to replace its existing metering infrastructure with AMI capable meters.[3] KAW provides a description of its current metering infrastructure:

> "The Company presently has approximately 143,720 meters and endpoints in service as of March 2025, almost all of which are equipped with automatic meter reading ("AMR") endpoints, across all or portions of 14 counties throughout Commonwealth of Kentucky."[4]

AMR and AMI Capable Water Meters

[3] See p.3 of the Direct Testimony of Justin Sensabaugh, July 11, 2025, in this proceeding ("Sensabaugh Direct").
[4] Ibid., p.3, l.17 – 20.

Q. What is the difference between AMR capable and AMI capable water meters?

A. AMR capable meters use a communication device (or endpoint) to allow the meter to be scanned and read locally (by driving by or manually). This is generally done once a month. AMI capable meters use a different type of endpoint to allow remote meter readings whenever prompted, as frequently as multiple times a day. As described by KAW:

> "AMR meters communicate with a transmitter that allows a meter reading device to read the meter by scanning it or by driving a vehicle equipped with a meter reading device past the meter to collect the read. Because AMR requires a meter reading device to drive by to gather data, AMR meters only provide a single meter reading per month instead of meter reading data as frequently as 96 times per day as is possible with AMI meters."[5]

Q. What is the difference between the actual water metering device for AMR and AMI capable meters?

A. The actual water metering device for both AMR and AMI capable meters can be the same. It is the compatible endpoint device that sits on the meter itself that determines if the data transmission is configured for AMR or AMI capability. The endpoint device merely transmits the meter data. Each water meter vendor has its own compatible endpoint.[6]

Q. How do AMI capable meter configurations communicate data?

A. Unlike AMR metering configurations that must be scanned locally, AMI capable meters communicate using either a fixed-network or an existing cellular network. KAW proposes to use an AMI cellular system, stating that it had

[5] See P. 11, l.8 – 13 of the Direct Testimony of Robert Burton, July 11, 2025, in this proceeding ("Burton Direct").

[6] See response to RFI AG1-33.

explored use of a fixed network system in a previous Cost-Benefit Analysis ("CBA") and found it was not cost effective.[7]

Q. Are there other differences between AMI and AMR capable meter configurations?

A. Another difference is the antenna or endpoint data transmission hardware requirements. In the equipment KAW has reviewed, the preferred AMI configurations require a meter pit lid that allows cellular data transmission. Except for about 20,000 Hersey/Muller brand AMR endpoints that sit below the meter pit lids, most of the existing KAW AMR meter configurations have the endpoint antenna protruding through a cast iron meter pit lid.[8]

Replacing either the existing 20,000 Hersey/Muller brand meter with AMR capable configurations or replacing all existing AMR meters with cellular AMI configured meters requires replacing the current cast iron meter pit lids with composite lids that are transparent to radio and cellular signals.[9] This also has the added benefit of optimizing signal coverage and reducing battery usage.[10]

Battery Usage and Life

Q. Is reduced battery usage an important consideration?

A. Yes. Batteries are an integral part of the endpoint and replacing the battery means the endpoint itself must be replaced.[11] In fact, KAW's practices for scheduled meter troubleshooting and testing on 2-inch and below meters is to replace the meter and endpoint assembly. Since all but 220 of KAW's 143,720

[7] See response to RFI AG1-4.
[8] See Application, Exhibit A, Advanced Meter Infrastructure Plan ("AMI Plan"), p. 16.
[9] While some configurations require composite meter pit lids, composite meter pit lids can be used for any AMR or AMI capable meter configuration. See response to AG1-39.
[10] Ibid., p.21.
[11] See response to RFI AG1-46.c.

water meters are 2-inch and below, this affects a majority of the meters.[12] While the slightly more than three thousand (3,093 according to the AMI Plan) of KAW's 1.5-inch and 2-inch meters may be repaired and returned to service after calibration and testing, the remaining 140,407 meters 1-inch and under are removed and replaced as part of the required testing interval.[13]

Replacement of 1-inch and Under Meters

Q. Is it reasonable to just replace the 1-inch and under water meters and endpoints without calibration and repair to return to service?

A. Given the relative cost of the meters, the 10-year testing requirement, and the documented battery life (for both AMR and AMI),[14] I believe it is. Additionally, as will be discussed, it appears that overall, the KAW water meters have an expected useful life of approximately 10 years regardless of the testing requirements.

Testing Requirements

Q. What are the testing requirements for water meters in the state of Kentucky?

A. Unless granted a deviation by the Commission, jurisdictional Kentucky water utilities are required to clean and test water meters based on the following minimum interval:[15]

Size of Meter Inches	Interval Between Tests Years
5/8	10
5/8 X 3/4	10

[12] See figure 9, p.15 of the AMI plan.
[13] See figure 12, p.19 of the AMI plan.
[14] See response to RFI PSC1-6.
[15] 807-KAR 5:066 Section 16

3/4	10
1	10
1 1/4	4
1 1/2	4
2	4
3	2
4 and larger	1

Q. Why would periodic testing and cleaning of water meters be required?

A. While potable water quality is assured by continuous testing and verification requirements, the water itself may contain corrosive minerals or sediments that over time can foul water meters and degrade their life and accuracy. As described by a research paper published by the International Water Association:

> "Water meters of different types and sizes are used to monitor and bill the water supply. Although the water is of drinking water quality, its chemo-physical properties often adversely affect the measuring behaviour of a meter after a while. There is thus the risk that they no longer meet legal requirements and may no longer be used."[16]

Simply put, while the potable water may be safe to drink, it can also foul metering equipment over time and affect accuracy. For this reason, periodic cleaning and testing are required for a water meter to stay in service. Depending on the size of the meter, and the required frequency of the testing, it may be more economical to simply replace the meter at a given maintenance frequency.

Testing Requirement Deviation for 5/8-Inch Meters

Q. Has KAW been granted a deviation from these testing requirements?

A. Yes. In Case No. 1996-00569 KAW asked for permission to extend the testing requirements for 5/8-inch meters claiming they remained accurate beyond 10

[16] See https://iwaponline.com/ws/article/22/4/4700/87629/Evaluation-of-the-measurement-performance-of-water

years of service. The Commission granted the application subject to a 10-year sample testing program to evaluate accuracy of meters that had been in service 10 years and longer.[17] After obtaining the results of this testing program KAW filed a request for a deviation of up to a 15-year testing interval for 5/8-inch meters in Case No. 2009-00253. The Commission granted this deviation provided that KAW remove all 5/8-inch meters at or before their 15-year interval and store them for a minimum of three months before discarding.[18]

Life of Service vs Testing Requirements

Q. Do you have any observations regarding the testing and the conclusions in these proceedings?

A. Yes. The sampling process appears to be focused on the amount of time that the 5/8-inch meters remain accurate.[19] In fact, the Test Procedures specifically did not consider non-functioning meters. Instead, the process only checked the accuracy of functioning meters removed after differing periods of time, to determine how long these meters could reasonably be expected to remain accurate.[20]

While this was appropriate for the objective of the testing, it did not measure the expected Life of Service (LOS) of the 5/8-inch meters, since meters that no longer functioned were eliminated from the sample population. When one considers that the most economical way to test 5/8-inch meters is to remove the meter, and then discard after testing, consideration of the LOS is critical. As both AMR and AMI communications depend on the battery performance integrated into the endpoint on the meter, LOS is also tied to battery

[17] See the September 30, 1997, Commission Order in Case No. 1996-00569 ("1996-00569 Order").
[18] See the October 5, 2011, Commission Order in Case No. 2009-00253 ("2006-00254 Order").
[19] See the Test Procedures incorporated into the December 31, 2008, Case No. 2009-00253 Petition ("Test Procedures").
[20] Ibid.

performance. KAW has indicated that battery performance is a common cause of meter failures and that the average duration of water meters for American Water Operating companies (including KAW) is 10.13 years across their 12-state footprint and 9.59 years in Kentucky.[21] In conclusion, while the meters that remain functioning appear to be reasonably accurate for up to 15 years, it appears the actual service life is more appropriately 10 years, particularly when meter readings are obtained with either AMR or AMI compatible endpoints.

Current Practice of 5/8-Inch Meter Replacement

Q. How does KAW propose to address the issue of interval testing for the 5/8-inch meters?

A. They have stated that they "…returned to a 10-year target LOS for those meters consistent with the meter testing regulations."[22]

Q. What would be the impact of immediately returning to the 10-year testing interval for 5/8-inch meters?

A. KAW has approximately 143,720 water meters, approximately 134,977, or about 94% of their water meters, are 5/8-inch meters.[23] Over the 2023 to 2024 period KAW replaced 47,000 meters using AMR capable meters.[24] To return the smaller meters to a 10-year testing cycle, KAW would need to replace a total of 39,625 meters in 2025, an amount that the company has determined it could not feasibly accomplish. Instead, those meter replacements were spread out over the 2025 to 2027 period. This resulted in an adjusted targeted replacement cycle that was

[21] See response to RFI PSC1-6.
[22] See Sensabaugh Direct p.5, l.10-11.
[23] See AMI plan, p.15, figure 9.
[24] See P. 4, l.18–19 of the Direct Testimony of Krista E. Citron, July 11, 2025, in this proceeding ("Citron Direct").

developed and used in both the AMI plan and the CBA comparing AMR to AMI contained in the AMI plan. [25]

Cost Benefit Analysis

AMI Implementation Plan

Q. Can you describe the CBA KAW has used to justify its request to implement AMI capable meters instead of AMR capable meters?

A. KAW has provided a broad description of the CBA in the Citron Direct Testimony and the AMI Plan. In addition, the actual spreadsheets that performed the analysis were provided in response to an RFI.[26] The basic approach of the CBA was to use a 20-year period to compare the costs and benefits of installing and maintaining both AMR and AMI capable water metering. Other than the communication technology and the unique aspects of that technology, all other cost and implementation assumptions appear to be the same.

For example, it was assumed that the targeted meter replacement and testing cycle is the same for either AMR or AMI capable metering. This means that there are no changes in the current planned meter replacement schedule and the AMI plan implementation schedule, that assumes installation of AMI capable metering in the course of its regular meter removals and replacement testing cycles, or meter failures. As stated in the application:

[25] Ibid., p.5, l.1-6.
[26] See KAW_R_AGDR1_NUM008_082925_Attachment A provided in response to RFI AG1-8.

"KAW proposes to install AMI-capable metering equipment only when metering equipment is already necessary due to meter failure or in the ordinary course of business through length-of-service ("LOS") replacements."[27]

Basic Assumptions

Q. How does the CBA treat other costs when comparing AMR and AMI technologies?

A. It appears that inflation assumptions, labor costs, overhead and growth factors, taxes, returns on investment, capital structure, and other costs were applied consistently for both AMR and AMI scenarios. Costs for both AMR and AMI scenarios were calculated for each year of the period of the analysis and then compared on a Net Present Value ("NPV") basis using the discounted cash flow based on KAW's proposed rate of return.[28]

Q. What is the assumed meter life used in the CBA?

A. The CBA uses the LOS of 10 years for average meter life for purposes of depreciation in the analysis. As previously discussed, approximately 140,407 of KAW's 143,720 water meters are 1-inch and under, or about 98%, and are subject to replacement every 10 years to meet the testing requirements, battery life, and expected service life.

Q. Is this the proper way to address depreciation in the CBA?

A. It should be noted that in regulatory ratemaking, the effect of depreciation rates and resulting costs are complicated by many factors, including tax considerations and other nuances of regulatory accounting. However, when performing a CBA, the life and replacement cycle of equipment is a primary concern to properly compare alternatives. This is the approach taken by KAW:

[27] See the p.2, paragraph 3 of the Application filed in this proceeding on July 11, 2025 ("Application").
[28] See Citron Direct.

"… For recognizing the cost of the investment over time, a 10% depreciation rate was used for the CBA, in order to match the costs of the investment over time with the benefits generated by the investment. To avoid undue refinement, this rate was applied to the entire capital investment, and no breakout was made to allocate portions of investment to cost of removal (which does not depreciate) vs. Utility Plant in Service("UPIS").

The result of this assumption on the CBA is that the calculated retail rate effect for each considered alternative may lack some precision. However, I believe the 10% assumption is adequate for its purpose, comparing AMR and AMI technologies.

Time Period Evaluated in the CBA

Q. What is period used for the CBA?

A. The CBA used the period of 20 years, 2026 to 2045, for the analysis. This compares to the assumed 10-year replacement life of the meters. The selection of the period used in the CBA is critical for two reasons. First, there is a one-time cost for implementing AMI because cast iron meter pit lids must be replaced with composite lids.[29] Once the meter pit lids are replaced, they do not need to be replaced again during the second 10-year targeted replacement cycle, years 2036 through 2045 of the CBA. Second, the benefits of not needing manual or drive by meter read of the AMR enabled meters is assumed to occur only once AMI is fully implemented, after 10 years.

Q. What is the difference in cost between AMR and AMI meter replacements in the first 10 years and the second 10 years?

A. The AMI Plan contains information that details the equipment and installation costs used in the CBA to analyze the difference between AMR and AMI installation. One of the vendors selected has better AMR pricing and the other

[29] As discussed previously, approximately 20,000 of the Mueller AMR enabled meters must also have composite meter pit lids. These are properly accounted for in the CBA.

vendor has better AMI pricing. KAW proposes addressing this difference by using the average costs of the technologies, rather than selecting the least cost AMR vendor and comparing it to the least cost AMI vendor. KAW justifies this approach as follows:

"Information was summarized for each technology type, by brand of product, and by average cost by technology type. An average price is helpful in the CBA for two reasons. First, American Water is not seeking approval of a project, but rather a long-term switch in technology as it performs routine meter and endpoint replacement. On an ongoing basis, the Company will be evaluating suppliers for performance and cost efficiency and may change brands over time as information changes, to support prudent investment. Second, this analysis compares the 2025 cost of products and applies only inflation to change these over time, implying that the differences between the cost of various products will remain constant for decades. In a marketplace with two direct competitors, it seems unlikely that significant differences in cost would persist indefinitely."[30]

The difference between costs of meter replacements over two ten-year periods for AMI and AMR is illustrated in the following Tables.[31] The first Table Compares the average AMR costs of the two selected vendors to the average AMI costs of the two selected vendors. The second Table compares the least cost AMR vendor to the least cost AMI vendor. Both tables use just the 5/8-inch meters to illustrate this difference since these meters make up about 94% of KAW's water meter population.

[30] See Citron Direct p.9, l.12-21.

[31] For source of the information in these tables see page 26, Figure 17 of the AMI Plan.

Two observations are immediately apparent. First the difference between AMI and AMR is obviously less in the second 10-year period than the first, because the meter pit lid only needs to be replaced with a composite lid the first time. Second, the difference between average AMI and average AMR replacement costs is much less than the difference between the least cost AMI and the least cost AMR. These differences are also illustrated on Figure 22, page 30 of the AMI plan discussion of the CBA results.

Q. Has KAW attempted to use a 20-year period to evaluate AMI technology before?

A. Yes. In a recent rate proceeding KAW attempted to also ask for a CPCN to transition to AMI technology. In the supporting CBA, KAW used a 20-year evaluation period in its analysis. In denying the request the Commission stated that it disagreed with the use of a 20-year NPV:

"… Additionally, the Commission is not persuaded by Kentucky-American's argument that 20 years was the minimum amount of time for the cost benefit analysis and associated NPVs in order to create a reasonable match between costs and benefits. The Commission disagrees with the use of an NPV of 20 years because Kentucky-American's only argument for utilizing it was because benefits were not expected to be reflected until year 11. The Commission notes that Kentucky-American's cost-benefit analysis accurately and realistically reflected AMI benefits within the first ten years. The AMI meters only had a ten-

year useful life, and therefore, the Commission evaluated the benefits of the meters within the useful life."[32]

Q. How does KAW's use of a 20-year analysis differ in this request?

A. First, it is hard to evaluate the two because the previous request was in the context of a rate request with the accompanying nuances and many additional factors for consideration. Also embedded in this case was KAW's revelation that it was abandoning its former position on removing, replacing, and testing its 5/8-inch water meters (about 94% of all its meters) at 15-year intervals, finding that they only had a LOS of ten years. This apparent change in practice and costs, as well as AMI technology, along with the other costs, created a large, proposed rate increase. Unlike that proposal this is not a rate proceeding, it is a request to switch technology. While the increased costs of this change will be considered in future rate requests, any deviation from those future forecasted costs can be compared to the predictions made in the CBA presented now by KAW.

Second, while both the AMI and the AMR meters only have a 10-year useful life, the replacement of the meter pit lids is a one-time cost of the AMI meters. Furthermore, these composite meter pit lids are expected to have a 50-year life.[33] If only a 10-year period is used to evaluate the costs this may not consider the lower cost of AMI implementation after the initial lid replacement. Thus, while some of the benefits involving meter reading costs will not be fully experienced until years 11-20, the costs of AMI will also decrease. Since both costs and benefits are needed to compare alternatives, evaluation of the years 11 through 20 seems needed to properly capture the cost difference of the alternatives.

[32] See page 12 of the Commission's April 9, 2024, Order in Case No. 2023-00191.
[33] See Response to RFI AG2-6.

Guidelines for the time frame of cost benefit analysis are subjective. The federal government has provided some limited guidance :

"… The time horizon and spatial scope for analyses should be selected to capture all the important benefits and costs to society expected to result from the project." [34]

The cost difference between AMR and AMI changes after the initial equipment replacement cycle due to the cost of replacing the meter pit lids. Because using an evaluation period of 20 years includes both the changes in costs and the additional benefits occurring in years 11-20, it does not seem unreasonable to accept the 20-year time frame of KAW's CBA.

Proposed Implementation Schedule

Q. Has KAW evaluated an accelerated implementation schedule of AMI technology?

A. The implementation schedule proposed by KAW is to gradually replace AMR meters with AMI technology as the meters are periodically removed and replaced over the predominantly 10-year LOS. It does not appear that they evaluated a faster implementation of AMI capable metering.

Q. Didn't the Commission already observe that KAW did not consider a faster AMI implementation?

A. Yes. In fact, the Commission observed just that in the 2023 rate proceeding.[35] Despite this KAW did not evaluate an accelerated implementation schedule in the current docket.

[34] "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," OMB Circular No. A-94, Revised, Nov. 9, 2023, at 7. https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-94.pdf

[35] See page 13, of the Commission's April 9, 2024, Order in Case No. 2023-00191.

Q. Should KAW have evaluated a faster AMI implementation schedule?

A. I think it would have been helpful. There are concerns with faster AMI implementation though. First, if existing meters are removed to install AMI enabled meters, then the existing meters are essentially removed before their expected end of life. This would either create an issue with early retirement of the assets and the effects on any subsequent depreciation analysis or possible stranding of investments. Additionally, it would be difficult to justify since the existing metering is performing a useful function until it needs replacement at the end of its service life. Finally, the analysis itself indicates that any acceleration of implementation costs ratepayers more than simply replacing the AMR meters at the end of their service life.

Q. Can you elaborate on how the analysis itself indicates that accelerating implementation of AMI would cost significantly more?

A. Because the analysis consists of comparing the normal 10-year replacement cycle of AMR with AMI, moving the AMI 10-year initial implementation costs, including all the meter pit lid replacement costs to years 1 through 3 for example, moves all of these costs closer to the present. In fact, by just changing the benefits portion of the calculation to 100 percent implementation in the CBA spreadsheet by year 2027, and without moving the implementation cost schedule forward, the overall NPV comparison of AMI to AMR narrowed, but AMI still had a slightly higher NPV. Obviously moving the AMI implementation costs forward would greatly increase this difference. While a detailed analysis of moving forward all of the costs and benefits of an accelerated AMI deployment would be interesting, it appears that the resulting analysis would not favor more rapid deployment of AMI than the proposed 10-year implementation cycle.

AMI Benefits

Q. Have you reviewed the benefits that KAW has counted for AMI technology?

A. KAW's AMI plan states that it considered only the benefits related to unscheduled and scheduled meter reading when performing the CBA.[36] Because there is little concentration of meters by age based on the geography of KAW's service territory, savings on scheduled meter read savings are not anticipated to begin until AMI is fully deployed, year 11 and on in the CBA. Unscheduled meter read savings occur as AMI is deployed and these benefits are considered in all years. While KAW lists multiple examples of customer and operational benefits in other jurisdictions from AMI information used for both troubleshooting and leak detection, there was no attempt to quantify these benefits for purposes of the CBA.[37]

Q. Do you believe there are other AMI benefits?

A. Certainly, there are more qualitative benefits AMI offers for the ratepayers and KAW. Customers will have the ability to verify and monitor water usage, as well as gain information for discussing issues with customer service, and receive timely alerts and alarms.[38] Additionally, AMI can provide not only all information that meters might measure, such as high flow rates or backflows, but also additional data that can be trended for customer information and KAW operations and maintenance. Furthermore, as more water utilities adopt AMI, this type of information may increasingly be expected by both customers and water utilities for efficient operations and maintenance. This type of "future proofing" has benefits that are difficult to quantify but are nonetheless useful.

As an example, I was part of an operating management committee at a power plant that was reviewing a necessary update to the operational control

[36] See p. 28-29 of the AMI Plan.
[37] See examples on page 9 through 15 of the CBA.
[38] See Sensabaugh Direct p.10, l.4-12.

system at a power plant (the existing equipment was obsolete). By merely upgrading the control system, and no changes to the instrumentation or equipment in the plant itself, the power plant was able to gain 5% output. If the data had not been available from the plant to start with, that upgrade would have been far too expensive to be feasible.

Results of the AMI Plan CBA

Q. Have you reviewed the results of the cost benefit analysis KAW used in its AMI Plan?

A. Yes. KAW states in its AMI Plan that the average rate impact between the average AMR costs and the average AMI costs is roughly [redacted] per month for each customer.[39] This amount is derived from Figure 23 of the AMI Plan which is titled "Meter Technology Comparison 20-Year Net Present Value of Costs Net of Benefits per Customer Month". However, an identical chart in the actual provided analysis[40] shows the difference is actually [redacted] per month per customer. This comparison is between the average AMI vendor solution costs net benefits and the average AMR vendor costs net benefits. However, while this is average, it should be noted that the result is the same as the difference between the least expensive AMI vendor solution and the least expensive AMR vendor solution.[41]

Q. What are your observations regarding the AMI Plan CBA and its conclusions?

A. The plan and analysis seem reasonable. KAW's assumptions of benefits is reasonable, and in fact somewhat conservative, in that more qualitative benefits

[39] See p. 30 of the AMI plan.
[40] See Tab "CompMultiCust" of spreadsheet KAW_R_AGDR1_NUM008_082925_Attachment A.xlxs provided in response to RFI AG1-8.
[41] Ibid.

to both the customer and utility were not quantified. Cost assumptions and vendor comparisons are recent and documented. KAW concluded that AMI implementation would cause a slight increase in monthly bills.

Other Issues

Vendor Selection

Q. Was the Commission concerned about the vendor pricing that KAW used in its last request for an AMI CPCN?

A. Yes. The Commission observed that KAW had only considered the pricing of two vendors from the results of a 2016 Request for Proposal ("RFP").[42]

Q. How did KAW address that concern in this proposal?

A. In 2024 KAW issued a Request for Information (RFI) to twelve vendors. After determining that several were disqualified or non-responsive, KAW compared the results to its minimum established criteria. As a result, two vendors were selected. KAW has provided substantial documentation related to this process in response to discovery.[43] While the selected vendors were the same two vendors used in the previous request, the documentation of the process appears thorough and current. After reviewing the documentation and process this selection appears reasonable. Furthermore, this process does provide assurance that the current equipment pricing seems appropriate in the analysis.

Obsolescence

[42] See page 15, of the Commission's April 9, 2024, Order in Case No. 2023-00191.
[43] See the response to RFI AG1-43.

Q. Under the AMI Plan, as proposed, will meters be removed that still provide useful service?

A. No. As proposed, KAW will replace AMR capable meters with AMI capable metering equipment as the normal course of replacing meters as they fail or are placed at the end of their useful life.[44]

Q. Is AMR metering still available?

A. Yes. KAW's response from vendors indicates that the technology is still widely available as meters and AMR endpoints are replaced when the meters fail or are at the end of their useful life.

Q. Are both AMR and AMI capable meters needed and useful?

A. Both technologies are a way to communicate the meter readings, and both serve a purpose. Metering itself is needed to allocate utility service and bill customers. Obviously, water meters could be read manually, by accessing the meter pit, but that is labor intensive. Communicating the meter readings by AMI or AMR accomplishes this function without the labor-intensive requirement to visually inspect each meter. Regardless, whether the meter is read manually, or by AMI or AMR, recording and obtaining meter readings is a needed and useful function.

In conclusion, AMR and AMI are merely technologies to obtain needed and necessary meter readings for purposes of operating the water system and billing. Neither of the technologies is obsolete, instead, as discussed, they both represent different benefits and costs. AMI technology provides more opportunities for future efficiency gains in utility operations and, perhaps, increasing customer expectations. AMR technology provides adequate

[44] See p.11, l.16-19 of the Direct Testimony of Robert Burton filed July 11, 2025, in this proceeding ("Burton Direct").

information for basic utility operations and billing. KAW's implementation plan is to replace either AMR or AMI meters at the end of their service life, or if the meter fails. The removed meter is not obsolescent; it is merely unable to perform its necessary function through failure or due to replacement at the end of its service life.

Conclusions and Recommendation

Q. What have you concluded regarding KAW's AMI plan and CBA?

A. I have made the following conclusions:

1. Approximately 98 percent of KAW's water meters are 1-inch and under. KAW's current replacement interval for its 1-inch and under meters and their endpoints appears reasonable given the relative cost and removal, calibration and repair, the required testing interval, and the meter's expected life of service.

2. KAW's 2024 vendor RFI and selection process provided updated information and pricing for its analysis. The result is reasonable cost estimates for both AMR and AMI capable meters for purposes of the CBA.

3. Either AMR or AMI capable meters are used and useful for communicating needed metering information. Replacing AMR metering with AMI metering during routine scheduled meter repairs and replacements does not indicate an obsolescence for either the AMR or AMI endpoints or the associated metering.

4. KAW's overall assumptions in its CBA comparing AMR and AMI technologies appear reasonable and consistent for either technology.

5. KAW's assumptions of AMI technology benefits are conservative. While KAW has provided examples of AMI enabled customer and operations benefits in other jurisdictions, it made no attempt to estimate these possible benefits in

the CBA. Overall, the assumptions of benefits may have underestimated the possible value of implementing AMI.

6. Despite Commission observations when KAW first proposed implementation of AMI in Case No. 2023-00191, KAW did not provide an analysis for the costs and benefits of implementing AMI on an accelerated basis. This does not appear to be critical because it does not appear likely that the earlier benefits could justify the accelerated costs of prematurely removing and retiring existing useful metering equipment. Nonetheless it would have been helpful for KAW to thoroughly address the absence of this consideration in its application and analysis.

7. KAW's use of a 20-year period in the CBA appears to capture one-time costs that occur only in years 1-10 as well as benefits that do not occur until years 11-20. For this reason, use of this time period and does not appear unreasonable.

8. The results of the CBA show that implementation of AMI is not the least cost option with an expected additional net present value of costs net of benefits of [redacted]/month per customer. While this is a relatively small increase in costs, the Commission should consider if the additional benefits that were not quantified, and possible qualitative and future benefits that were not considered, justify this additional cost to ratepayers.

Q. Does this complete your testimony?

A. Yes.

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

ELECTRONIC APPLICATION OF KENTUCKY-AMERICAN WATER COMPANY FOR A CERTIFICATE OF PUBLIC CONVENIENCE AND NECESSITY FOR INSTALLATION OF ADVANCED METERING INFRASTRUCTURE	))))	CASE No. 2025-00240

AFFIDAVIT OF LARRY HOLLOWAY, P.E.

State of Kansas)
)
)

Larry Holloway, being first duly sworn, states the following:
The prepared Pre-Filed Direct Testimony attached hereto constitute the direct testimony of Affiant in the above-styled cases. Affiant states that he would give the answers set forth in the Pre-Filed Direct Testimony if asked the questions propounded therein. Affiant further states that, to the best of his knowledge, information and belief his statements made are true and correct. Further affiant saith naught.

Larry Holloway

SUBSCRIBED AND SWORN to before me this 26th day of September, 2025

NOTARY PUBLIC

My Commission Expires: NOTARY PUBLIC - State of Kansas PATRICIA ROLOFF My Appt. Exp. 5/6/29

Work History and Recent Relevant Experience

Utility Consultant — November 2012 – Present

Provided independent utility consulting expertise for the Kentucky Attorney General's Office, Maine Office of Public Advocate, the City of Sidney Nebraska, and KPP Energy. Assistance included the review of two large special contracts and review, analysis and testimony regarding transmission costs and charges, rate design, and generation operation, costs and forecasts on three rate cases, as well as technical review of a complex power sale and a detailed engineering review of a proposed environmental program and the associated cost pass through mechanism.

KPP Energy — March 2009 – February 2025
Assistant General Manager – Operations

Preparation of annual budget, including load forecasts, purchase power and fuel costs, generation capacity costs, and pool wide rate design for a wholesale not for profit municipal energy agency that provides 24 municipal utilities with generation supplies and transmission service.

Preparation of technical information and forecasts used for issuing municipal bonds to finance generation and member distribution and transmission projects. Participation in discussions with Moody's and Fitch regarding bond ratings.

Responsible for securing generation resources and transmission service for KPP members. Review and analysis of generation and transmission options, including equipment procurement, contractor and engineer selection, and purchase power options. Oversight of administration of service contracts for transmission scheduling, Information technology, and metering services.

Responsible for coordinating and providing expert testimony in rate, merger, complaint, certification and regulatory policy proceedings before state and federal regulatory bodies. Representative for regional transmission organization policy making committees.

Responsible for providing assistance to member municipal electric utilities in their review and adoption of policies and rate mechanisms for customer owned solar generation or adoption of rate mechanisms and special contracts for unique customers or for economic development.

Kansas Corporation Commission (KCC) — July 1993 to March 2009
Chief of Energy Operations

Supervised the energy operations section which was responsible for electric and natural gas utility performance, class cost of service and rate design. Provided electric utility industry expert testimony before the KCC as member of KCC Staff in over 40 dockets, including dockets involving electric utility policy, performance, rate reviews and proposed mergers and acquisition.

Acted as Commission liaison before many groups including legislative committees, industrial groups, NARUC, environmental groups, civic organizations, utility groups, federal agencies, regional reliability councils, transmission organizations and state social agencies.

Provided presentations, courses and speeches on a variety of KCC and industry issues to many groups including legislative committees, regional transmission organizations, industry conferences and international regulatory bodies.

Wolf Creek Nuclear Plant -WCNOC — June 1989 to July 1993
BOP System Engineering Supervisor

Browns Ferry Nuclear Plant- TVA — August 1987 to June 1989
Senior System Engineer

Trojan Nuclear Plant – Portland General Electric — October 1984 to August 1987
System Engineer III

Wolf Creek Nuclear Plant – Matsco — April 1983 to October 1984
Contract Startup Engineer

Burns & Roe – WNP 2 — September 1982 to April 1983
Nuclear Design Engineer

Ebasco Inc – Waterford Nuclear Plant — June 1981 to September 1982
Construction Engineer

FMC Inc – Inorganic Chemical Plant — June 1979 to June 1981
Project Engineer

Kansas Power & Light – Natural Gas Division — June 1978 to June 1979
Field Engineer

Education

University of Kansas, Kansas
Bachelor of Science Civil Engineering, December 1977
Bachelor of Science Mechanical Engineering, May 1978
Master of Science Mechanical Engineering, May 1997
Washington State University, Washington
Master of Engineering Management, May 1988

Professional Registration

Registered Professional Mechanical and Civil Engineer, State of Oregon, PE license No. 12989

Expert Witness Testimony

FERC	Provided analysis and affidavit in FERC Docket ER01-1305. for the KCC, which led to a negotiated settlement in an affiliate purchase power agreement between Westar Energy and Westar Generating Inc., and affiliate which resulted in a formula-based rate for capacity and energy charges.
KCC	KCC Staff testimony in Docket Nos. 95-EPDE-043-COM, 96-KG&E-100-RTS, 96-WSRE-101-DRS, 96-SEPE-680-CON, 97-WSRE-676-MER, 98-KGSG-822-TAR, 99-WSRE-381-EGF, 99-WSRE-034-COM, 99-WPEE-818-RTS, 00-WCNE-154-GIE, 00-UCUE-677-MER, 01-WSRE-436-RTS, 01-WPEE-473-RTS, 01-KEPE-1106-RTS, 02-SEPE-247-RTS, 02-EPDE-488-RTS, 02-MDWG-922-RTS, 03-MDWE-001-RTS, 03-WCNE-178-GIE, 03-MDWE-421-ACQ, 03-KGSG-602-RTS, 04-AQLE-1065-RTS, 04-KCPE-1025-GIE, 05-EPDE-980-RTS, 05-WSEE-981-RTS, 06-WCNE-204-GIE, 06-SPPE-202-COC, 06-WSEE-203-GIE, 06-KCPE-828-RTS, 06-KGSG-1209-RTS, 06-MKEE-524-ACQ, 07-WSEE-616-PRE, 07-KCPE-905-RTS, 08-WSEE-309-PRE, 08-KMOE-028-COC, 08-WSEE-609-MIS, 08-MDWE-594-RTS, 08-WSEE-1041-RTS, 08-ITCE-936-COC, 09-KCPE-246-RTS, and 08-PWTE-1022-COC.
KPP	Testimony on behalf of KPP in Kansas Corporation Commission Docket Nos. 09-MKEE-969-RTS, 11-GIME-597-GIE, 12-KPPE-630-MIS, 15-SPEE-161-RTS, 16-KPEE-470-PRE, 16-KCPE-593-ACQ, 17-KPPE-092-COM, 18-KCPE-095-MER, 18-KPPE-343-COC, 19-SEPE-054-MER, and 19-GLPE-338-ACQ.
Consulting	Testimony on behalf of Kentucky Attorney General's office in Case Nos. 2012-00535, 2013-00199, 2016-00370 and 2016-00371. Testimony on behalf of the Maine Office of Public Advocate in Docket Nos. 2019-00097, 2021-00289, 2022-00025, and 2022-00152.