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Use of a "Basic Water Service" is an inappropriate metric by which to measure residential water affordability.

NOTE TO READERS

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The Concept of "Basic Water Service" should Play no Role in Measuring Residential Water Affordability.

American Water Company (AWC) in the past year has argued in rate cases involving its state operating utilities (e.g., Pennsylvania American Water Co., Illinois American Water Co., Missouri American Water Co.) that its residential rates are not only generally affordable, but that they have become *more* affordable over time.

Generally, AWC compares bills for what it terms "Basic Water Service" to median household income (MHI) in making its argument. More specifically, AWC compares its bills for Basic Water Service to median household income for homeowners. The impropriety of using MHI for homeowners as the foundation of its claims of affordability was addressed in the November-December 2024 issue of *FSC Law & Economics Insights*. This issue addresses the fallacy of using "Basic Water Service" as the basis for assessing affordability.

Median Household Income is not an Appropriate Measure for an Affordability Analysis.

Before turning to the specifics of why AWC's concept of "Basic Water Service" is inappropriate, it is important to remember that the use of Median Household Income (MHI) is a fundamentally flawed metric to use in assessing water affordability.

The use of MHI has been almost universally criticized as the basis for an affordability analysis. To provide an overview of this criticism, consider the following:

- **Environmental Finance Center (University of North Carolina):**[1] "By definition, half of the households in a community will have an income less than MHI. Because these households have smaller incomes than the median household, they potentially face much greater affordability challenges. Thus, using percent MHI on its own can obscure the affordability issues that low-income households face within a service area. If the goal of the affordability analysis is to understand whether a utility or community should focus on mitigating affordability, then using the percent MHI provides little insight compared to other more precise metrics. The American Water Works Association suggests highlighting the percent of income a household on the lower end of the spectrum would pay (twentieth percentile of income) as an alternative measure. ...

  Focusing on the percentage that the median household pays can leave the impression that the customer base pays relatively little for water. Shifting the analysis to the impoverished threshold highlights a more realistic percentage for the families likely to have the most affordability challenges. ... using percent MHI alone can obscure the problem—leading utility managers or regulators to believe that they do not have any affordability concerns. Relying on percent MHI can mask the hardships faced by families that are most at risk of facing affordability issues.[2]

- **American Waterworks Association (AWWA):**[3] "MHI can be a highly misleading indicator of a community's ability to pay for several reasons. MHI is a poor indicator of economic distress and bears little relationship to poverty or other measures of economic need within a community. ... Given the relatively large percentage of households in the lower portions of the income distribution in many cities, it is important to examine the effect of rising water bills across the entire income distribution—and especially at the lower end—rather than simply at the median."[4]

- **AWWA/U.S. Conference of Mayors/Water Environment Federation:**[5] "A central issue in assessing af-

[1] "Founded in 1998, the University of North Carolina at Chapel Hill Environmental Finance Center (UNC EFC) reaches local communities and state and federal programs by delivering applied training programs and technical assistance, resource and interactive tool development, and in-depth applied research on best and emerging practices." https://efc.sog.unc.edu/

[2] Irvin (2017). Is Percent MHI the Best Way to Measure Affordability? Environmental Finance Center, University of North Carolina.

[3] "The American Water Works Association is an international, nonprofit, scientific and educational society dedicated to providing total water solutions assuring the effective management of water. Founded in 1881, the Association is the largest organization of water supply professionals in the world. Our membership includes over 4,300 utilities that supply roughly 80 percent of the nation's drinking water and treat almost half of the nation's wastewater." https://www.awwa.org/About-Us

[4] Stratus Consulting (2013). Assessing the Affordability of Federal Water Mandates, AWWA, U.S. Conference of Mayors and Water Environment Federation

[5] "The Water Environment Federation (WEF) is a

fordability of federal water mandates is the reasonableness of community-wide MHI as a primary yardstick. MHI can be a highly misleading indicator of a community's ability to pay for several reasons. ... MHI is a poor indicator of economic distress and bears little relationship to poverty or other measures of economic need within a community."[6]

- **National Academy of Public Administration:**[7] "Not focused on the poor or most economically vulnerable users – Using MHI did not accurately reflect the impact on the most vulnerable households, the low-income users least able to absorb higher water bills. ... Clearly, MHI is too broad an income measure to reflect the impact of water rate increases on low-income users"[8]

Even the very publication which AWC's primary witness cites as support for his use of a percentage of MHI criticizes the use of MHI as the basis for claims of affordability. Indeed, the author which AWC cites concludes that "[d]espite its widespread use, the %MHI approach is seriously flawed." He explains that:

> Perhaps the most frequent criticism of the %MHI standard is that its focus on median income misses the real subject of affordability concerns: poor households. The median-income household is unlikely to face serious water and sewer affordability problems in any but the smallest or most desperately poor communities. For low-income households, however, water and sewer services may force important economic tradeoffs. Measuring affordability as a function of an entire community's MHI obscures the effects of rate-setting on low-income customers, for whom utility leaders presumably have the greatest affordability concerns. Certainly, the tenor of public policy debates surrounding utility affordability suggests that low-income residential customers are the focus of alarm. As income stratification in a community increases, the degree to which %MHI masks potential affordability problems increases.[9]

Conclusions like those above—that the use of an MHI in an affordability analysis "can obscure the affordability issues," "provides little insight," "obscures the problem", "can be [] highly misleading", "bears little relationship to poverty

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not-for-profit technical and educational organization **of** more than 30,000 individual members and 75 affiliated Member Associations (MAs) representing water quality professionals around the world." https://www.wef.org/about/Governance/about/

[6] AWWA/USCM/WEF (2013). Affordability Assessment Tool for Federal Water Mandates.

[7] "Established in 1967, the Academy responds to requests for assistance from Congress, federal agencies; and state, local and international government entities on issues of importance." The Academy is a Congressionally-chartered non-partisan 501(c)(3) non-profit. ("The Senate Appropriations Committee, in a committee report on FY 2016 legislative language, directed the Environmental Protection Agency (EPA) to contract with the National Academy of Public Administration (the Academy) to conduct an independent study to create a definition of, and framework for, community affordability of clean water.")

[8] National Academy of Public Administration (2017). Developing a New Framework for Community Affordability of Clean Water Services, prepared for the U.S. Environmental Protection Agency.

[9] Teodoro (2018). Measuring Household Affordability for Water and Sewer Utilities, Journal of the American Water Works Association, 110:1(13).

or other measures of economic need", does "not accurately reflect the impact on the most vulnerable households", "obscures the effects of rate-setting on low-income customers" and "masks potential affordability problems"—all lead to the conclusion that AWC's analysis based on MHI should not be used for decision-making in this proceeding.

AWC's Use of "Basic Water Service."

AWC defines "Basic Water Service" to be "water usage level that reflects the level of water consumption for basic human services (cooking, cleaning, sanitation, and general health requirements)." The Company's witness explains further that "Basic Water Service is meant to represent" what in his opinion, is that "water consumption for basic human services (e.g., cooking, cleaning, sanitation, and general health requirements)." In both Pennsylvania and Illinois, AWC assigns a value of 40 gallons per person per day as its definition of Basic Water Service.

Reliance on Basic Water Service has Fundamental Flaws

There are both conceptual and empirical flaws in AWC's analysis of Basic Water Service. The Company defines Basic Water Service to be the service that is necessary and reasonable to meet basic household needs for drinking, cooking, sanitation, and general health service. At no point, however, does AWC make any effort to identify what water is needed for drinking, cooking, sanitation, and general health service, let alone to assess which of those uses are "necessary and reasonable to meet basic household needs."

AWC concedes that the definition of basic service is not built from the ground up by identifying end uses and the water consumption associated with each potential end use. Instead, the Company's witness asserts that his use of 40 gallons per household member per day "is based on the review of relevant literature on the subject and a review of Company billing data for residential customers in months with minimum levels of discretionary water usage, all of which supports the definition of 40 gallons of water per household member per day."

Fundamentally, AWC thus does not attempt to base its determination of what represents the level of service "necessary and reasonable to meet" particular end household needs. In the 2024 Pennsylvania-American Water Company rate case, for example, the Company was asked to describe all "standards and/or metrics applied to determine what service is 'necessary and reasonable.'" In that case, AWC's witness conceded that he does not use a process "identifying end uses and the water consumption associated with those end uses and thus ***does not rely on standards or metrics as described***. . ."

The fact that AWC does not consider what service is necessary and reasonable for customers is evident from the fact that, according to AWC's analysis, each of the following families would have an identical "basic water and/or wastewater service" of 3,600 gallons per month:

- A three-person household with one adult, one school-age child, and one teen-age child;
- A three-person household with two adults, and one school-age child;
- A three-person household with one adult, and two teen-age children;
- A three-person household with one adult, one infant, and one school-age child;

- A three-person household with one adult, and two infants; and

- A three-person household with one adult, and two school-age children.

In other words, AWC erroneously asserts that its notion of "Basic Water Service" is universally comprised of 40 gallons of water consumption per day, irrespective of any individual or demographic characteristic of the household. The Company makes no adjustments based on various demographic factors of the customer.

He ignores, for example, the relationship between his Basic Water Service and: (1) the age of children in a household; (2) the age of adults in a household; (3) the number of children in a household; (4) the number of adults in a household; (5) the income of a household; (6) the size of a housing unit; (7) the owner/renter status of a household; and (8) the housing unit type occupied by a household.

AWC's "assumption" of a basic water use of 40 gallons per household member per day does not even consider how many household members are at home at any given time, or for how long. AWC's witness states that this figure does not vary seasonally. It does not, for example, increase during the summer months when school-age children are not in school, but are instead at home all day, even though more than 40% of the families in the Company's service territory have children. He doesn't consider the difference in household needs for water even though half of all school-age children in the IAWC service territory (51.4%) are teen-agers.

AWC's notion of Basic Water Service, in other words, simply "assumes" that the Basic Water Needs of a household with two teen-agers is the same as the Basic Water Needs of a household with two pre-school children.

What Constitutes "Basic Household Needs" is Undefined, Let Alone the Water Required to meet those Needs

If AWC's notion of "Basic Water Service" is that level of water consumption "for basic human services," it would seem that someone needs to be deciding what "human services" are considered "basic human services" and what *level* of water consumption is needed for each of those services.

AWC, however, asserts that doing this is not needed, and that that process does not occur. He simply never addresses the shortcomings in his use of a concept of "Basic Water Service" which purportedly represents the level of consumption needed for "basic human services," but he never defines the "basic human services" which are in play or what "level" of use is associated with those unidentified and undefined "basic human services."

The result is an analysis set forth by AWC based on some undefined, amorphous notion of "Basic Water Service" which can be set at any level the Company wishes to use at a particular time, and can be used or ignored whether its use, or not, happens to support what AWC chooses to argue in the moment.

AWC's Use of 40 Gallons per person per Day is Artificially Low

AWC's assertion that its Basic Water Service consists of an assumed consumption of 40 gallons per household member per day is significantly lower than the daily water consumption generally reported on a per-person basis.

What is perhaps considered to be the seminal study on residential water consumption is the 2016 Water Research Foundation's report "Residential End Uses of Water, Version 2." That WRF report found that "per capita water use has decreased 15 percent, from 69.3 gpcd[10] to 58.6 gpcd.[11] This does not even include the outdoor water usage which AWC references as "seasonal usage" that would exceed what is included in its notion of "Basic Water Service."

The WRF research found water consumption by end use as follows:

Average Daily Indoor Per Capita Water Use by End Use[12]	
Toilet	14.2
Clothes washer	9.6
Shower	11.1
Faucet	11.1
Leak	7.9
Other	2.5
Bath	1.5
Dishwasher	0.7
Total	58.6

Again, AWC makes no effort to build its definition of Basic Water Service up by identifying individual end uses. The Company's witness explicitly concedes that "the definition of basic service is not built from the ground up by identifying end uses and the water consumption associated with those end uses. . ."

If such an effort had been pursued, AWC would have discovered that the assumption of 40 gallons of water use per person per day would have allowed a person to use the toilet (14.2 gppd), take a shower (11.1 gppd), and use a home's faucets (11.1 gppd), but would not allow that person to wash their clothes (9.6 gppd). Even if one were to exclude "leaks" from the discussion (7.9 gppd), the WRF research found a usage of 50.7 gppd, a 27% increase unto itself from AWC's Basic Water Service assumption.

The WRF estimated consumption of 58.6 gppd is aligned with other authoritative estimates of average consumption per person per day. The U.S. Environmental Protection Agency (EPA), for example, reports that "each American uses an average of 82 gallons of water a day at home," but reports, further, that "more than 30%" of that usage is for "outdoor" consumption.[13] If one were to set EPA's "more than 30%" equal to 30%, the indoor water use would be 57.4 gppd consumption. If we set EPA's "more than 30%" equal to 35%, the indoor water use would be 53.3 gppd, still 33% higher than AWC's "basic water service" assumption.

Looking at that Literature which AWC Says Supports its 40 gppd Basic Water Service

AWC does cite literature, but that literature does not support the Company's approach. In support of its use of Basic Water Service, defined to be a usage of 40 gallons per person per day, AWC asserts that its claims are supported by the Company's review of "the relevant literature on the

[10] "GPCD" is "gallons per capita per day."

[11] The two acronyms (GPPD and GPCD) are interchangeable. GPPD refers to "gallons per person per day." GPCD refers to "gallons per capita per day."

[12] Water Research Foundation (2016). Residential End Uses of Water, Version 2, Executive Report, at 8, available at https://www.waterrf.org/research/projects/residential-end-uses-water-version-2

[13] U.S. EPA, Water Sense, Statistics and Facts, at 1, 3, available at https://www.epa.gov/watersense/statistics-and-facts

subject … *all of which* supports the definition of 40 gallons of water per household member per day." (emphasis added).

After making an identical assertion in its 2024 Pennsylvania American Water Company rate case, however, the Company was asked to provide copies of all the relevant literature he had reviewed. The response pointed only to the Cardoso and Wichman report[14] cited in the Company's direct testimony.

In that report, however, Cardoso and Wichman ***disagree*** with the Basic Water Service of 40 gallons per household member per day used by AWC. They also establish what they reference as "a fixed level of water consumption deemed essential."[15] They define that level, however, as ***50*** gallons per person per day. They go on to "consider alternative scenarios for levels at 25, 75, and 100 gppd." The usage of 50 gppd is important in that it is virtually identical to the usage (in gppd) reported by the WRF report discussed above and closer to the EPA estimate that is AWC's estimate. In short, not only does AWC provide no "support" for the suppositions and methodology in the articles which the Company, itself, cites, but the Basic Water Service which AWC uses appears to be ***at least*** 25% too low.

Summary

Persons interested in obtaining more information about assessing the affordability of water bills in a community (or utility service territory), or about assessing water use by various demographics (e.g., age, gender) can write:

roger [at] fsconline.com

[14] Cardoso, Diego S. and Wichman, Casey J., "Water Affordability in the United States," Water Resources Research, vol. 58, issue 12 (2020).

[15] *Id.* at 6.

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