ENVIRONMENTAL FINANCIAL ADVISORY BOARD

January 15, 2025

The Honorable Jane Nishida
Acting Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Dear Acting Administrator Nishida,

The Environmental Financial Advisory Board (EFAB) is pleased to submit our report, **Advancing Water Affordability Nationwide: A Framework for Action**, which was developed by the EFAB Water Affordability Work Group in response to a five-part charge from USEPA's Office of Water. The Work Group met extensively from November 2023-December 2024 and concluded, among other issues, that it would be useful to provide EPA and water resource utilities nationwide with an overarching framework as a way of comprehensively analyzing the various opportunities available to ameliorate water sector affordability challenges. The report and its 26 recommendations are organized around this framework.

After many decades of relatively inexpensive water services, the affordability of drinking water, wastewater, and stormwater management is a mounting concern. Household water bills are still relatively cheap for many people – particularly compared with energy, internet, phone, and other monthly expenses. However, the cost of providing clean, safe, and reliable water services is escalating. Cities, towns, and utilities nationwide will require greater levels of investment to address aging infrastructure, regulatory requirements, climate change impacts, emerging contaminants, lead service line replacements, and other issues. Rates for drinking water, wastewater and stormwater management will continue to rise. And for many people, even at current rates, paying for water services is a struggle.

Water affordability issues are exacerbated by the fact that water is paid for primarily at the local level; local ratepayers shoulder the burden for about 95% of the nation's drinking water and wastewater infrastructure as federal spending on water has declined substantially since the 1970s. Even the extraordinary federal investments in local water infrastructure under the Bipartisan Infrastructure Law (BIL) and other recent enactments are unlikely to move this needle substantially.

Indeed, a consensus is emerging that ensuring water affordability for vulnerable populations is critical, and a growing body of literature has been exploring water affordability issues. For this inquiry, EFAB adopted the widely held view that water affordability is a household level, versus community level, issue best viewed as "the ability of a customer to pay the water bill in full and on time without time without jeopardizing the customer's ability to pay for other essential expenses." In response to the elements in EPA's charge, this report synthesizes much of that work and presents a holistic framework for EPA and others to consider in addressing water affordability challenges. Discussions about how to make water more affordable for low-income households often begin and end with customer assistance programs. As important as these programs are, however, the framework concept is that utilities can address household water affordability at various points in their decision making and financing processes, and through various mechanisms as most appropriate for their community and ratepayer needs, from capital investments to operations to rates to federal financial support.

An important point to bear in mind in reviewing this report is that while it is frequently noted that there are roughly 50,000 community water systems nationwide, only 4,300 of these serve the vast majority of the nation (83% of all households). This is because most CWSs serve fewer than 500 people. The affordability issues faced by these very small, under-resourced drinking water and wastewater systems, often somewhat isolated from municipal water and wastewater grids, are significant and cannot be overlooked. However, these challenges are often fundamentally different than the affordability issues facing the utilities that serve most of the nation's cities and larger towns, including the largest populations of lower-income and disadvantaged communities. In keeping with the particulars of EPA's charge to EFAB, this report focuses primarily on strategies most appropriate for water and wastewater utilities serving 10,000 people or more.

Water affordability is one of the more difficult and multifaceted issues facing EPA and the nation today. We commend the agency for its engagement on the complexities involved in working to ensure that people and communities nationwide are able to afford safe and healthy drinking water, as well as wastewater and stormwater management services. EPA has a vital role to play in providing states, Tribes, and communities with the resources, tools, data, and information they need to make the best possible decisions for their customers. We are hopeful that this report will provide a meaningful basis for continued and expanded progress going forward.

We want to thank EPA staff in the Office of Water for its engagement over the past fourteen months and the insights and perspectives they shared. EFAB would welcome ongoing engagement with the agency on issues related to this report and implementation of any of its recommendations. We would welcome the opportunity to host the agency at our Spring meeting to provide any updates on its review of this report. We thank you for the opportunity to be of service to the Office of Water.

Sincerely,

Kerry E. O'Neill, Chair
Environmental Financial Advisory Board

Cynthia Koehler, Co-Chair
EFAB Water Affordability Workgroup

Janet Clements, Co-Chair
EFAB Water Affordability Workgroup

Enclosure

cc: Edward H. Chu, Designated Federal Officer, Environmental Financial Advisory Board
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Environmental Financial Advisory Board

Advancing Water Affordability Nationwide: A Framework for Action

January 2025

This report has not been reviewed for approval by the U.S. Environmental Protection Agency; and hence, the views and opinions expressed in the report do not necessarily represent those of the Agency or any other agencies in the Federal Government.

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Table of Contents

Executive Summary

Introduction: EFAB Affordability Framework

The U.S. Environmental Protection Agency (EPA) Environmental Finance Advisory Board (EFAB or Board) developed this report in response to a five-part EFAB charge related to the affordability of water, sewer, and stormwater services (see Figure ES-1 for full charge text).

After many decades of relatively inexpensive water services, the affordability of drinking water, wastewater, and stormwater management is a mounting issue. Household water bills are still relatively cheap for many people – particularly compared with energy, internet, phone, and other monthly expenses. However, the cost of providing clean, safe, and reliable water services is escalating; for at least the past decade, increases in water and wastewater rates have outpaced growth in household incomes and the general rate of inflation. Cities, towns, and utilities nationwide will require greater levels of investment to address aging infrastructure, regulatory requirements, climate change impacts, emerging contaminants, lead service line replacements, and other issues. Rates for drinking water, wastewater, and stormwater management will continue to rise. And for many people, even at current rates, paying for water services is a struggle.

A consensus is emerging that ensuring water affordability for vulnerable populations is critical, and a growing body of literature has been exploring water affordability issues. In response to the elements in EPA's charge, this report synthesizes much of that work and presents a holistic framework for EPA and others to consider in addressing water affordability challenges. As described in greater detail below, this inquiry is framed by a few context-setting observations:

- In the U.S., water, sewer, and stormwater services are paid for primarily at the local level.
- Affordability is a household-level problem, distinct from the cost of regulatory compliance for communities as a whole.
- The affordability challenges facing the 9 percent of utilities that serve 85 percent of the U.S. population, including the majority of low-income households, are generally of a fundamentally different nature than the access and affordability issues facing the thousands of very small utilities serving primarily small, often isolated areas. This paper for the most part focuses on the former and recommends a deep dive into the latter.
- While there is no universally accepted definition of water service affordability, for purposes of this report, we concur with a recent American Water Works Association (AWWA) Expert Panel that water affordability can be viewed ***"as the ability of a customer to pay the water bill in full and on time without jeopardizing the customer's ability to pay for other essential expenses*."**

In response to EPA's five-part affordability charge, EFAB developed a high-level roadmap, or framework of considerations, for addressing water sector affordability issues. Discussions about how to make water more affordable for low-income households often begin and end with customer assistance programs (CAPs). As important as these programs are, affordability can be addressed at various levels from capital investments to operations to rates to federal financial support. The framework concept is that utilities can address household water affordability at various points in their decision making and financing processes, and through various mechanisms, as most appropriate for their community and ratepayer needs as indicated in Figure ES-2.

Figure ES-1. Five Part EFAB Affordability Charge

The five-part charge includes the following affordability-related elements:

1. **Capital Investments:** Conduct a high-level exploration of types of capital projects that could address local water service needs that are innately less burdensome on local ratepayers. For example, large-scale water use efficiency measures can be an alternative to a more expensive new pipeline. This objective will not involve a comprehensive study of such alternatives but will address how consideration of infrastructure investment choices can be broadened to include unconventional options that are more affordable for the whole community while still solving for the water infrastructure challenges. The deliverable would ideally include a survey of the types of capital projects that have already been shown to have substantial promise as alternatives and supplements to conventional water systems.
2. **Customer Assistance Program (CAP) Barriers:** Identify and analyze common state and/or local legal barriers (and possibly other types), including perceived barriers, to adoption of CAPs and other affordability measures, and provide recommendations for EPA to address these. For example, few states explicitly preclude CAPs; instead, they establish broad restrictions on how ratepayer funds can be used, which can provide some room for flexibility. Having a more precise understanding of the 3-5 primary types of barriers will provide a foundation for EFAB's recommendations to address affordability challenges.
3. **Rate Structure/Design:** Identify and analyze options for rate structure/design to help households who would be adversely affected by significant rate increases for water services, focusing on what can be accomplished within the bounds of existing legal requirements or restrictions (where those exist). Options might include, but would not be limited to, lifeline rates, income-based rate structures, senior assistance plans, host community rate structures, payment restructuring programs, and customer charge waivers.
4. **State Revolving Fund (SRF) Subsidies:** Research the possible flow of SRF funds, through rate structures or other mechanisms, for additional subsidization to ratepayers that would experience a financial hardship because of an increase in rates necessary to fund capital infrastructure projects.
5. **EPA Support:** Provide recommendations on ways that EPA could support legal arguments and develop supportive policy for providing customer assistance and provide leadership in guiding program implementation. These recommendations would recognize that EPA's role is not directive but limited to providing resources and guidance that could be useful to states in navigating affordability issues.

Figure ES-2. EFAB Affordability Framework

The elements of EFAB's affordability framework are as follows:

- Capital Investments: The amount a customer pays for water services is driven by utility investments in infrastructure - what they build and how they build it. This report discusses infrastructure and project delivery alternatives that can provide meaningful cost savings over the long term.
- Operational Efficiency: Numerous resources have been developed to support utilities seeking to maximize operational efficiencies, thereby limiting costs and ratepayer burdens.
- Federal Financial Support: The federal government, and some states, offer various financial support options for local water capital investment, including grants, below-market-rate loans, principal forgiveness, other "additional subsidies," and more.
- Rate Structures and Design: Many water service providers have options for creating more equitable rate structures that can reduce financial burdens for low-income customers within current legal and regulatory parameters.

- Customer Assistance Programs: There are households in every community unable to pay for essential water services, either chronically or in response to unexpected crises. CAPs can provide bill assistance directly to these customers through bill discounts, water use efficiency programs, payment management plans, and other methods.

Capital Investments

Water infrastructure is the most capital-intensive utility to operate, with some analysts estimating it to be twice as capital-intensive as providing electricity, and three times as capital-intensive as providing gas. Water infrastructure decisions can impact ratepayers for decades to come. While the cost of conventional water infrastructure is rising at record rates, utilities increasingly have a wider array of alternatives to meet their drinking water, wastewater, and stormwater management objectives, both in terms of the options they choose to invest in, as well as how they go about implementing those decisions.

Alternatives to Conventional Infrastructure

Advances in water technology, use of data, as well as green and nature-based infrastructure mean that communities are better positioned than in the past to develop diverse water infrastructure portfolios that could be more affordable in the long run rather than defaulting to conventional systems and approaches that are often more expensive. In this regard, EPA has requested that EFAB:

> *. . . .conduct a high-level exploration of types of capital projects that could address local water service needs that are innately less burdensome on local ratepayers. For example, large-scale measures as an alternative to a more expensive new pipeline. This objective will not involve a comprehensive study of such alternatives but will address how consideration of infrastructure investment choices can be broadened to include unconventional options that are more affordable for the whole community while still solving for the water infrastructure challenges (e.g., water supply, treatment, stormwater capture, etc.). The deliverable would ideally include a survey of the types of capital projects that have already been shown to have substantial promise as alternatives and supplements to conventional water systems, such as green stormwater infrastructure and technologies aimed at reducing system leaks.*

Single purpose conventional built water infrastructure systems can be less resilient in the face of climate change, the cost of upgrades, and emerging challenges. Technological and other innovations are making it possible, in the right circumstances, for utilities to invest in decentralized, “One Water” alternatives that integrate with built systems and can result in substantial avoided costs and/or cost savings, potentially leading to greater affordability over time. By treating all water as assets to be employed, rather than waste to be disposed of, these alternative or hybrid approaches can also provide greater climate resilience and other co-benefits, which further supports keeping infrastructure investments more affordable.

This report does not attempt to serve as a comprehensive review of water infrastructure alternatives; it instead provides a high-level review of alternative approaches, a number of illustrative case studies, and recommendations to EPA for gathering more comprehensive data and other information. The approaches explored in the report include:

- Water Use Efficiency as a Source of Water Supply
- Green Stormwater Infrastructure (GSI)
- Source Water Protection Interventions as Water Quality Infrastructure
- Optimization with Intelligent Infrastructure
- Regionalization of Water Infrastructure (in connection primarily with very small utilities)

Capital Investment Recommendations: Alternatives to Conventional Infrastructure

The decisions that cities, towns and utilities make about their investments in water infrastructure significantly impact the cost of water services and household affordability. Certainly, there will be times when more expensive options will be the right ones to address particular health, safety, reliability, or other priorities. However, it may often be the case that a more robust portfolio of strategies – one that blends nature-based, digital, and other non-traditional water infrastructure with built systems – can help to ensure that water services are more cost-effective over time.

EFAB recommends the following eight actions to EPA for further consideration and potential development in this regard:

1. **Commission study on relative costs of alternative infrastructure investments.** Commission a comprehensive study documenting utility and regional data on the cost of green, distributed, nature-based, digital, and regional water infrastructure options implemented nationwide. This would be extremely valuable to communities and utilities seeking tangible information about how the cost of these strategies has played out in other areas.

2. **Identify standardized approach for assessing the life cycle benefits and costs of distributed and nature-based water infrastructure alternatives.** This effort should include approaches for assessing the benefits and costs of water use efficiency, source water protection, watershed restoration, GSI, and water reuse, to allow for an apples-to-apples comparison with more conventional approaches to capital investment in water infrastructure. This would involve compiling and refining the approaches that have been developed to date, not reinventing the wheel. While much work has been conducted on this topic, it can be hard to access and/or to adapt to specific utility circumstances.

3. **Elevate/highlight tools that have been developed for quantifying and valuing the co-benefits of nature-based infrastructure.** Elevate and highlight the tools that have been developed for quantifying and valuing the co-benefits associated with green infrastructure, energy efficiency (e.g., generating energy onsite), and other non-traditional water infrastructure, such as reduced urban heat island effect, creating more urban green space, economic and workforce development, and improved air quality, among others. While distinct from Recommendation 2, ideally these efforts would be closely integrated.

4. **Create a comprehensive EPA affordability website.** Create a new affordability page on EPA's website that repurposes, updates, and integrates EPA's current set of resources related to each component to the affordability framework that EFAB has developed. The website should incorporate resources related to each section outlined in this report. With respect to capital investment alternatives to conventional infrastructure, the website would include resources

related to GSI, water efficiency and conservation, reuse, recycling, and digital solutions, among others, from utility cost savings and affordability perspectives.

5. **Expand EPA Integrated Planning Guidance and related policy to include drinking water regulations.** Revise EPA's integrated planning guidance to incorporate more of a "One Water" approach. Specifically, this would include incorporating compliance with drinking water regulations, in addition to wastewater and stormwater requirements, into EPA's Integrated Planning Process. Integrated planning identifies efficiencies, benefits, and affordability to best prioritize capital investments and achieve human health and water quality objectives. Integrated planning should balance compliance timelines with affordability, and the ability to assist low-income households, and prioritize projects (and mandates) that provide the greatest benefit to ratepayers.

6. **Develop metrics and an affordability screening tool to help utilities integrate affordability into capital planning/investment decisions.** EPA has developed a similar tool in its Financial Capability Assessment (FCA) Guidance in the context of regulatory compliance; but this could be revised as an optional tool for utilities seeking to elevate local affordability issues in decision making. It could include, for example, measures of success that would allow utilities to examine forecasted spending against financial and affordability objects.

7. **Develop a biennial publication highlighting case studies of non-traditional water infrastructure.** Develop a biennial publication highlighting case studies and lessons learned related to nature-based, digital, green and other forms of non-traditional water infrastructure for distribution to states and local governments. Ideally these case studies would be widely amplified not only through EPA's networks, but through the Environmental Finance Centers (EFCs), academics, non-governmental organizations (NGOs), community-based organizations (CBOs) and others capable of reaching a wide audience.

8. **Create PISCES and TAURUS awards for non-traditional water infrastructure.** Create distinct PISCES and TAURUS awards that recognize the most innovative non-traditional water and wastewater infrastructure projects funded by the Drinking Water State Revolving Fund (DWSRF) and Clean Water State Revolving Fund (CWSRF) in each of five categories: conservation-based, distributed, nature-based, digital, and regional water infrastructure.

Alternative Delivery Models

The other key aspect of water affordability involving capital investments involves how infrastructure decisions are implemented, i.e., how the utility designs, bids, and builds their water projects. For many utilities, the project development process can be made substantially more affordable by adopting a holistic approach that emphasizes all phases of project planning, design, and construction. Conventional project delivery models can suffer from challenges that affect the total amount a community will need to pay for infrastructure, including: (1) over-designing or overbuilding projects; (2) using models that elevate lower up-front costs, but end up costing the community more over time due to high operations and maintenance costs; and (3) misaligning incentives, such that total project cost increases over time. All of these drivers increase the total expense associated with infrastructure projects, burdening ratepayers with higher than optimal costs, as discussed in more detail below. This report outlines several opportunities to address these challenges including:

- Taking an integrated approach to project delivery planning.
- Building new leadership capabilities emphasizing a culture of collaboration and people-focused management.
- Addressing statutory constraints that can unnecessarily limit the forms of project delivery available to community water systems (CWSs).

Capital Investment Recommendations: Alternative Delivery Models

The methods utilities use to design, bid out, and build local water infrastructure can significantly affect household water affordability. EFAB recommends the following four actions to EPA for further consideration and potential development (note these are numbered sequentially with the recommendations presented in the previous section):

9. **Study impact of alternative project delivery models on lifecycle costs of water infrastructure.** Commission a study on the impact of various project delivery strategies on the lifecycle costs of water infrastructure projects.

10. **Evaluate legal barriers to alternative project delivery models.** Commission a study of current state and local ordinances that allow or prohibit various water project delivery strategies, with lessons learned and tools (e.g. model ordinances) for overcoming identified barriers.

11. **Highlight long-term capabilities needed to effectively implement and maintain water infrastructure projects.** Develop high-level suggestions and ideas for how utilities can best organize to have the long-term capabilities needed to carry out the planning, designing, building, operating, and maintaining of water system capital improvement projects. These capabilities should ideally include incorporating quality-based selection processes.

12. **Initiate series of workforce development studies.** Initiate a series of studies to improve workforce development in the water sector. While science, technology, engineering, and math (STEM) skills are important, the water sector also requires strong leadership and management skills that are not often integrated into STEM programs.

Operational Efficiencies

Utility operations offer another opportunity to explore lowering the cost of providing water services with positive outcomes for affordability. EPA has long recognized the importance of effective utility management (EUM) practices, including asset management, as a key operational tool for maximizing benefits and limiting life cycle cost. Asset management is the practice of managing water infrastructure capital assets in conjunction with ongoing operation and maintenance (O&M) to minimize the total cost of owning and operating those assets. EPA has developed substantial resources to support both EUM and utility asset management, and there is a wealth of information available on these topics from EFCs, academics, water sector associations, and others. While these subjects are outside of the direct scope of the current EFAB charge, given the potential impact of utility operational costs on affordability, and EPA's long history of providing resources related to these topics, they are important to flag for purposes of the water affordability roadmap.

Operational Efficiency Recommendations

In relation to utility operational efficiency, EFAB recommends the following actions to EPA for consideration:

13. **Develop case studies to highlight successful asset management programs.** Commission a review of 12 to 24 successful water utility asset management programs that have resulted in significant cost savings.

14. **Develop federal incentives for utility asset management programs.** Develop incentives for local water utilities to implement asset management programs focused on maintaining utility fiscal health.

Federal Financial Support (SRF Additional Subsidy)

While federal spending on local water infrastructure represents a small fraction of total spending in this area, some federal support is available to help communities defray the cost of water infrastructure investments (but not operations) and, in some cases, specifically support household water affordability. EPA administers two SRFs – the CWSRF and the DWSRF. Together, the SRFs represent the greatest level of federal financial support for local water infrastructure, primarily in the form of low interest (i.e., below market rate) loans.

Recognizing that loans may not be sufficient for many communities, Congress has directed both SRF programs to provide "additional subsidization" (with the below market interest rate loan being the first subsidization) to utilities serving low-income populations. The additional subsidization represents a portion of the SRF loan that does not need to be repaid, and is intended to defray all or part of an increase in household water bills necessary to repay the SRF loan.

The SRF additional subsidies are primarily available to eligible low-income communities. However, the statutory eligibility criteria for "low-income" under the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA), which respectively authorize the two SRF programs, differ in important ways. Most critically for purposes of this report, the CWA directs that additional subsidy can be provided to communities seeking SRF loans that do **not** meet the community-level CWA affordability criteria if other specific metrics are met, including undue hardship to low-income ratepayers resulting from a CWSRF loan. This provision has been identified as a tool that could help address a key challenge that large utilities often face; having substantial low-income populations within their service areas that would, on their own, qualify for additional subsidy, but the overall higher income of the community precludes these utilities from being eligible for SRF additional subsidy awards. In this regard, EPA has requested that EFAB:

> *Research the possible flow of SRF funds, through rate structures or other mechanisms, for additional subsidization to ratepayers that would experience financial hardship because of an increase in rates necessary to fund capital infrastructure projects.*

It appears that there may be substantial under-utilization of the relevant additional subsidization provision of the CWA, (33 USC § 1383 (i)(A)(ii)), with potential to support low income households when the community affordability criteria are not met but the additional subsidy could be sought by the SRF loan applicant to support residents who would be adversely impacted by rate increases related to repayment of the loan. While EPA has provided guidance and encouragement to state SRF programs to address this issue, for the most part state SRF programs are not programming SRF funds for this purpose for several reasons.

First, SRF programs have experienced significant declines in the allocation of federal funds in recent years as earmarks have been reintroduced at relatively high levels. In addition, providing CWSRF additional subsidy to otherwise non-eligible communities could involve substantial challenges including but not limited to; the administrative cost to develop a parallel award program, reallocation of limited subsidy funds from existing programmatic goals, separate application processes and qualifications for utilities with eligible subcommunities, and reporting requirements.

Distinct from the Clean Water SRF, additional subsidy is also provided under the Drinking Water SRF for "disadvantaged communities" (DACs). This report does not address SWSRF additional subsidy issues in detail because, the unlike the CWA, the Safe Drinking Water Act does not include a provision allowing for additional subsidy where the eligibility criteria – i.e., the state definition of DACs – have not been met. However, in light of EPA's engagement on DAC state definitions, and the direct impact of those definitions on the availability of additional subsidy to address water affordability, it is appropriate to briefly acknowledge these issues as well. A key question has been how state level DAC definitions can best capture hardship and risk factors; for example, some states are shifting from historic reliance on Median Household Income (MHI) as a primary metric and toward a more inclusive approach employing environmental justice tools.

SRF Additional Subsidy Recommendations

With respect to leveraging SRF subsidies to assist low-income households, EFAB offers the following recommendations:

15. **Create a pilot program to implement the CWSRF Additional Subsidy for low-income households.** Identify water utilities that are interested in partnering with their state CWSRF program to pilot a project that could be awarded loan funds with additional subsidy to channel to low-income utility ratepayers within the service area.

16. **Develop guidance toolkit to help SRFs implement the CWSRF Additional Subsidy for low-income households.** Develop a guidance toolkit advising SRF programs managers of the opportunity to program CWSRF funds to low-income customers, including ways to award, set up the funding, work with a utility, and push the administrative burden of the program to the benefiting utility. Eventually the guidance toolkit should be revised to incorporate lessons learned from program pilots. Key focus areas of the toolkit would include:

    - Award criteria.
    - Application – require utilities to collect data to identify the number of eligible households that could receive channeled assistance funds and the calculation of assistance per households that would defray the related debt service cost to these households.
    - Guidance on ways to channel funds to target low-income households such as an existing utility low-income assistance program, local community action agencies that distributed COVID-19 Low Income Water Household Assistance Program (LIHWAP) funds, and considerations for hard-to-reach populations such as multiunit renters that pay utilities

through a landlord who owns the master metered building account. (see also CAP section of this report)

- Ways to award the funds that will be distributed over the life of the loan – see example of Washington State Conservation Reserve Enhancement Program Trust Fund reserve – Washington develops/administers 15-year contracts with farmers who are compensated for planting native vegetation along salmon bearing streams instead of crops. Buffers are preserved under 10–15-year renewable contracts. Project costs are paid for by the program. This kind of analog could guide a sinking fund trust fund approach to reserving the assistance funds for the life of the loan to be awarded and drawn on through the life of the debt service to defray the low-income bill impact.

17. **Continue to explore approaches for defining DACs under DWSRF.** Build on EPA's existing effort to identify key elements that would reduce disparities among households resulting from state DAC definitions. This exercise would, of course, require considerable sensitivity to the fact the states have broad discretion in this regard and address widely different circumstances nationwide.

Rate Structures and Design

Rate structures provide another opportunity for utilities to address affordability challenges, particularly in states and communities that are not burdened by legal barriers to rate structures that support water affordability. In this regard, EPA has requested EFAB:

> *To identify and analyze options for rate structure/design to help households who would be adversely affected by significant rate increases for water services, focusing on what can be accomplished within the bounds of existing legal requirements or restrictions (where those exist). Options might include, but would not be limited to, lifeline rates, income-based rate structures, senior assistance plans, host community rate structures, payment restructuring programs, and customer charge waivers. This analysis would be integrated with [the] element involving the legal limitations on consumer assistance programs (CAPs).*

This report reviews cost of service rate setting principles and provides an overview of the types of state level legal guidance and restrictions on water and sewer utility rate setting that can limit the ability of water utilities to use rate revenues to address local household affordability challenges. It also provides options for enhancing affordability through rate design while following the traditional cost of service framework and abiding by relevant statutes in most states. These "affordability friendly" rate strategies include but are not limited to (1) reduced fixed charges, (2) individualized lifeline rates, and (3) class-based volumetric rates and seasonal rates. Establishing a separate impervious area-based stormwater charge can also more equitably allocate costs across customers, reducing the cost burden for residential customers (including multifamily accounts).

In addition, there may be substantial value in expanding the conventional cost of service framework to recognize water as a public good, explicitly including human health and/or affordability as core utility functions. Expanding the definition of utility services to include public health and affordability would enable utilities to incorporate related costs into traditional cost of service rate design. Related, it could be useful to quantify the costs incurred by utilities associated with non-payment (administrative, collections, impact on creditworthiness, etc.).

These efforts could facilitate implementation of rate-funded programs that provide more direct assistance to customers, such as income-indexed rates and CAPs (see next section). Income-indexed rates ensure a basic level of water service for low-income households at a reasonable price based on their specific circumstances (i.e., their incomes), although these programs can be challenging to implement.

Rate Structure Options for Enhancing Affordability Recommendations

Pursuant to this topic, EFAB recommends the following five actions to EPA for consideration and development:

18. **Develop a policy statement that recognizes the benefits of expanding the cost-of-service framework to incorporate affordability/public health.** Issue a new EPA policy supporting expansion of the cost-of-service framework to include public health and affordability. Establishing such a policy would recognize that customers receive significant benefits when all residents in a community have access to clean and reliable water services. This effort would provide a stronger legal basis for funding CAPs or income-indexed rates through rate revenues by providing a nationally endorsed approach for cost-of-service ratemaking. It would be useful to work with national water sector organizations and other key stakeholders (including potentially EFAB) in developing this policy.

19. **Incorporate utility affordability actions/efforts into federal funding decisions.** Incorporate prioritization criteria related to how well utilities are addressing affordability (e.g., through rate design and/or CAPs) into federal water and wastewater infrastructure funding/financing program decisions. Specifically, EPA should develop criteria for state level SRF programs providing higher point values for utility applicants that are addressing local water affordability challenges proactively and effectively. There is precedent for this prioritization via EPA's updated FCA Guidance Financial Alternatives Analysis. These criteria could also apply to Water Infrastructure Finance and Innovation Act (WIFIA) loans and other federal water infrastructure funding sources.

20. **Provide examples of state statutes that may allow for funding CAPs and/or incorporating public health/affordability into cost-of-service rate practices.** Provide examples of state statutes that can serve as models for rate guidance that could allow for funding CAPs and/or income-based rates with rate revenues, and/or incorporating public health and affordability into cost-of-service rate practices.

21. **Provide enhanced technical assistance for utility rate development.** Provide enhanced technical assistance to utilities for rate development, particularly for mid-sized utilities and for stormwater fees. Many of the existing EFCs throughout the U.S. are well suited to provide this assistance, and some already do.

22. **Study the effect of alternative rate structures on affordability.** Commission studies to explore key rate-related affordability issues, including:

- Advantages and disadvantages of income-indexed rates, focusing on the financial impacts to utilities and customers.
- Impact of best practices for rate design on utilities and low-income customers.

Customer Assistance Programs

CAPs can take various forms. Typical models include: (1) bill discounts; (2) flexible terms; (3) temporary assistance; (4) direct installations of water use efficiency measures; and (5) lifeline rates. While a growing number of utilities have adopted CAPs, as EPA has recognized, the reach of utility-led CAPs is limited. Utilities were not established to provide social assistance programs and, with the exception of some notably excellent programs, generally have not excelled in this space. In this regard, EPA has requested EFAB:

> *To identify and analyze common state and/or local legal barriers (and possibly other types), including perceived barriers, to adoption of CAPs and other affordability measures, and provide recommendations for EPA to address these. For example, few states explicitly preclude CAPs; instead, they establish broad restrictions on how ratepayer funds can be used, which can provide some room for flexibility. Having a more precise understanding of the 3-5 primary types of barriers will provide a foundation for EFAB's recommendations to address affordability challenges.*

EFAB has identified several interrelated, overarching reasons for the limited effectiveness of utility-led CAPs nationally: (1) real, and in some cases, perceived legal barriers to funding CAPs; (2) relatively low rates of participation; and (3) low levels of funding or other available resources to implement CAPs. In addition, many of the country's lowest income households (particularly in urban areas) are "hard-to-reach," meaning they do not pay their bill directly to a utility but through rent or similar fees. This means they do not benefit from most traditional assistance programs.

Customer Assistance Program Recommendations

Several of EFAB's recommendations related to rate structures are also applicable to CAPs as they include pathways for reducing legal barriers associated with funding assistance programs with rate revenues. EFAB offers the following additional recommendations related to CAPs.

23. **Offer planning grants to help utilities develop affordability programs/initiatives.** Offer planning grants to water and wastewater utilities to support the development of local affordability and/or assistance programs. As noted above, many utilities do not offer CAPs, and many are not well equipped to fully understand the affordability challenges within their community. Providing planning grants and technical assistance to develop and implement CAPs based on successful models could help utilities overcome capacity and resource limitations and other barriers.

24. **Articulate key principles and evaluate alternative pathways for a federal water customer assistance program.** Support development of a federal CAP for water and wastewater by articulating key principles that should be included. Conduct a study to explore the advantages and disadvantages of alternative pathways for providing such a program**.** Key principles for a federal assistance program should include:

- Focus on increasing assistance for those most in need rather than focusing primarily on helping utilities capture lost revenue from past due bills.
- Include renters and multifamily households (including households who do not pay their water bill directly to a utility), as these customers as a group typically face greater affordability challenges.
- Prioritize limiting the administrative burden on applicants and allow for automatic enrollment and/or categorical eligibility whenever possible.
- Prioritize limiting the administrative burden on local utilities (in keeping with observation that "water services sector did not evolve to address poverty relief and is acutely challenged to do so").
- Prioritize limiting costs and administrative burdens on federal program managers by maximizing the use of existing, more or less well-functioning systems and organizations/agencies, and simplifying eligibility requirements.
- Embrace the principle of not allowing the perfect to be the enemy of the good; specifically planning for the reality that no program will reach every household in need, and that some will receive assistance who may not technically be as in need as others.

25. **Develop compendium of best practices and case studies of successful utility-led CAPs.** Develop a compendium of best practices and provide case studies of successful local, utility-led CAPs, including those that have successfully overcome barriers related to enrollment/participation, hard-to-reach customers, and/or funding barriers. The compendium and case studies should be published semi-regularly (e.g., biennially), highlighting new and best practices in the field. Key information should include how utilities identified affordability challenges within their community and designed their programs accordingly, as well as successful outreach and enrollment strategies.

26. **Study the costs of nonpayment, shutoffs, and other aspects of unaffordable bills for utilities.** Commission a study to quantify the administrative and other costs associated with non-payment, and related service shutoffs, to help make the business case for CAPs. Conducting service shutoffs and managing arrangements is expensive and time-consuming, and these costs are covered primarily by rate revenue. Reliable data on these costs are difficult to come by, however, and so it would be useful for EPA to provide a comprehensive review of the cost of pursuing consumers for non-payment in comparison to the costs of providing more effective customer assistance through the rate options outlined above.

EPA Water Affordability Needs Assessment

EFAB notes that EPA has recently released a Water Affordability Needs Assessment[1] documenting the impact of the water affordability burden felt across the nation. Consistent with EFAB's more high level review, EPA has found that the need for both capital investment and operations support still outpaces the tools at utilities' disposal and that "large-scale, sustainable change requires addressing the systemic

[1] EPA, Water Affordability Needs Assessment: Report to Congress (Dec. 2024) EPA 830-R-24-015. EPA was directed to prepare this assessment per the Infrastructure Investments and Jobs Act (IIJA), Section 50108.

challenges in how water utilities are funded, how rates are set, and how assistance programs are established to support rate payers." EFAB's review and EPA's Needs Assessment have been developed on parallel tracks and should be viewed as synergistic. The Needs Assessment references this report and states that:

> *Recommendations stemming from the EFAB Water Affordability workgroup will help establish a path of wholistically addressing water affordability and provide a roadmap of recommended approaches. It is recommended that EPA evaluate and, where appropriate, pursue these recommendations.*

Introduction and Background

After many decades of relatively inexpensive water services, the affordability of drinking water, wastewater, and stormwater management is a mounting issue. Household water bills are still relatively cheap for many people – particularly compared with energy, internet, phone, and other monthly expenses.[2] However, the cost of providing clean, safe, and reliable water services is escalating; for at least the past decade, increases in water and wastewater rates have outpaced growth in household incomes and the general rate of inflation.[3] Cities, towns, and utilities nationwide will require higher levels of investment to address aging infrastructure, regulatory requirements, climate change impacts, emerging contaminants, lead service line replacements, and other issues, and rates for drinking water, sanitation, and stormwater management will continue to rise. And of course, for many low-income households, even at current rates paying for water services is a struggle.

A consensus is emerging that ensuring water affordability for vulnerable populations is critical, and a growing body of literature by governmental entities, academics, water sector associations, non-profit groups, and others has been exploring water affordability issues from various angles.[4] In response to the elements in EPA's charge (described above), this report attempts to synthesize much of that work and take a holistic approach to water affordability and to craft a framework for EPA, state SRF programs, and utilities to address affordability challenges. At the outset, we provide a few context-setting observations.

1. Water is paid for at the local level.

Local ratepayers shoulder the burden for approximately 95 percent of the nation's drinking water and wastewater infrastructure.[5] Federal spending on water has declined substantially since the 1970s and early 1980s, with local governments largely picking up the slack. Even the extraordinary federal

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[2] EPA WaterSense, Assistance That Saves: How WaterSense Partners Incorporate WUE into Affordability Programs (2020) (hereinafter "WaterSense 2020") at 3.

[3] See, e.g., Berahzer et al, GASB. 2018. Implementation Guide No. 2018-1, Implementation Guidance Update — 2018. ¶¶ 4.4, 4.5, available at: https://tapin.waternow.org/wp-content/uploads/sites/2/2022/10/GASB_Implementation_Guide_No._2018-1.pdf.

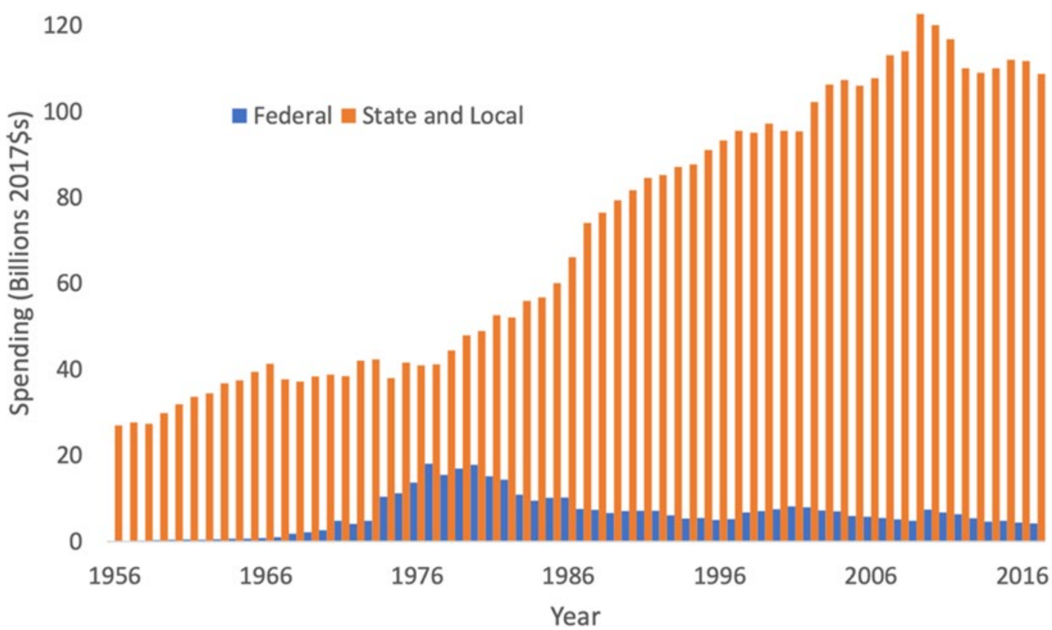
Final Report (April 20, 2023)(prepared for AWWA, AMWA, NACWA, NAWA, WRF) at E-3; AWWA, Improving the Evaluation of Household-Level Affordability in SDWA Rulemaking: New Approaches Expert Panel (2021) *Panel Co-Chairs* Cary Coglianese, University of Pennsylvania; John Graham, Indiana University (hereinafter "Coglianese 2021") at 5. At least one observer has noted that over a recent 6 year period (2017-2023), increases in drinking water and wastewater rates have not been out of line with other prices over the same period and increased more slowly than the price of other consumer goods; Teodoro, Tarriff Trends (Jan. 24, 2024).

[4] E.g., see EPA 2016, Raucher et al. 2019, Teodoro and Saywitz 2019, Cooley et al. 2022, Rothstein et al. 2021, Berahzer et al. 2023, AWWA 2022 (Thinking Outside the Bill).

[5] Koehler, C. & C. Koch, Innovation in Action: 21st Century Water Solutions (WaterNow 2019) at 12. Note there is very little actual state spending on local water infrastructure; state spending is generally provided in the form of SRF expenditures, which involve federal appropriations plus loan repayments.

investments in local water infrastructure under the Bipartisan Infrastructure Law (BIL) and other recent enactments are unlikely to move this needle substantially (e.g., see Figure Intro-1, showing state and local vs. federal spending on water and wastewater through 2017). As long as most of the cost of water infrastructure is borne by local water ratepayers, water affordability will continue to be problematic for households that are struggling financially.

Figure Intro-1. Federal and state/local investment in water utilities, 1956 to 2017, USD Billions (CBO 2018)



2. Local water utilities are not all created equal.

It is frequently noted that there are roughly 50,000 community water systems nationwide. However, approximately 83 percent of U.S. households are served by the 9 percent of utilities (approximately 4,300) that provide water to 10,000 people or more.[6] Most of the CWSs listed in EPA's Safe Drinking Water Information System (SDWIS) database serve fewer than 500 people.[7] According to the most recent figures in EPA's database, approximately 19,000 utilities provide wastewater and/or stormwater management services nationwide, serving more than 75 percent of the U.S. population. These include publicly-owned treatment plants, wastewater collection systems, municipal separate storm sewer systems, and combined sewer stormwater systems.

The affordability challenges faced by very small, under-resourced drinking water and wastewater systems that are often somewhat isolated from municipal water and wastewater grids, are significant

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[6] EPA SDWIS data 2022

[7] Teodoro, MP, Water and Sewer Affordability in the United States: A 2019 Update. AWWA Water Sci. (2020).

and cannot be overlooked (see sidebar on the crisis of access to water services in the U.S.). However, these challenges are often fundamentally different than the affordability issues facing the utilities that serve most of the nation's cities and larger towns, including the largest populations of lower-income and DACs. This report focuses primarily on strategies most appropriate for larger water and wastewater utilities, defined by EPA as CWSs serving 10,000 people or more.[8]

3. Water infrastructure investment and affordability needs are substantial.

Many have reflected on the intrinsic dichotomy facing the water sector; substantial rate increases are required to finance critical system investments, but it is just as important to ensure that these essential services are affordable and accessible to everyone.[9] As indicated throughout this report, a larger financing realignment may be necessary if the U.S. is to achieve both objectives.

A recent study commissioned by several national water organizations estimates that between 7.5 and 21.3 million U.S. households are "water burdened," and that between $2.4 and $7.9 billion in annual water bill assistance would be required to eliminate these burdens.[10] To put this in context, funding for the Federal LIHWAP, a temporary water assistance program established to relieve acute water affordability challenges experienced during the COVID-19 pandemic, totaled only $1.1 billion over a three-year period. By contrast, funding for the Low-Income Heating and Energy Assistance Program, the permanent federal assistance program for energy, was more than $6 billion in 2023 alone.

EPA's 2024 Drinking Water Infrastructure Needs Survey and Assessment (DWINSA)[11] illustrates the scale of the investment required to meet drinking water needs. DWINSA reports a twenty-year capital improvement need of $629 billion ($31.5 billion per year) for states, Washington DC, Puerto Rico, and Tribal communities. On the wastewater and stormwater side, EPA's 2022 Clean Watersheds Needs Survey reports a similar 20-year need, totaling $630.1 billion ($31.5 billion per year). Thus, the annual need for assistance ($2.4 to $7.9 billion) amounts to 3.8 to 12.5 percent of the annual total combined needs for drinking water and clean water infrastructure.

4. Affordability is a household-level problem.

As many have observed, water affordability is fundamentally a household-level phenomenon.[12] However, much of EPA's work on water affordability has instead, and for important reasons, focused on

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[8] EPA defines small systems as those serving less than 10,000 people.

[9] e.g., Berahzer, et. al., Low-Income Water Customer Assistance Program Assessment: Final Report: (April 20, 2023).

[10] Berahzer, et. al., Low-Income Water Customer Assistance Program Assessment: Final Report: (April 20, 2023). These figures do not consider the substantial number of economically challenged households who face increasing costs of private well and/or septic systems.

[11] https://www.epa.gov/dwsrf/epas-7th-drinking-water-infrastructure-needs-survey-and-assessment

[12] e.g., Teodoro, MP, Water and Sewer Affordability in the United States: A 2019 Update. AWWA Water Sci. (2020).

community scale financial capacity to achieve compliance with the CWA requirements.[13] While the agency has generated a substantial amount of highly valuable information, tools, and guidance,[14] there is an important distinction between the cost of regulatory compliance for communities as a whole, and the somewhat different challenge of ensuring that vulnerable households are able to afford drinking water, wastewater, and stormwater management services without economic hardship.

Higher prices for critical local water services, particularly when combined with rising costs of other basic living expenses, create significant economic challenges for low-income and many middle-income ratepayers. As EPA has previously recognized, almost every community has customers who struggle to pay their water bills.[15] For some, this is a chronic issue; others have unexpected crises that affect their ability to pay.

For a household in the middle of the U.S. income distribution (about $74,500 in 2022), an annual water bill of roughly $500, or about $42 per month, is unlikely to be a hardship. For lower-income households, however, the same water bill can be burdensome. The 20th percentile of U.S. household income distribution in 2022 was about $30,600. Of the 41 million Americans living in poverty that year, almost half were living in "deep poverty" (defined as 50 percent of the federal poverty level or $15,300 for a family of four).[16] In a typical year, roughly 15 million people experience water shutoffs due to nonpayment.[17] Low-income households that do pay their water bills often reduce, or simply do not pay, for other necessities, such as medical care/expenses.

There is no universally accepted definition of water affordability in the U.S. Indeed, it has been suggested that determining what is affordable in the water space is "ultimately a normative question akin to a philosophical inquiry."[18] While it may be difficult to pinpoint exactly when and where water services are "unaffordable," to paraphrase the Supreme Court, we know it when we see it.[19] For this inquiry, water affordability can be viewed ***"as the ability of a customer to pay the water bill in full and on time without jeopardizing the customer's ability to pay for other essential expenses."***[20] EPA has similarly indicated

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[13] See, UA EPA, Clean Water Act Financial Capability Assessment Guidance (Feb. 2023). Note the Guidance expressly states that it is "not a method for defining water affordability" (at 1).

[14] EPA's most recent Financial Capability Assessment Guidance indicates a shift away from allowing municipalities to delay compliance with public health-based rules based on community-wide affordability concerns.

[15] Drinking Water and Wastewater Utility Customer Assistance Programs (2016) (hereinafter "EPA CAP 2016") at 1.

[16] American Community Survey 1-year estimates, 2022

[17] See, Coglianese 2021 at 7; Dig Deep, Draining: The Economic Impacts of America's Hidden Water Crisis (2022) at 23.

[18] Teodoro, MP, Water and Sewer Affordability in the United States: A 2019 Update. AWWA Water Sci. (2020).

[19] Jacobellis v. Ohio, 378 U.S. 184 (1964) (Stewart, J., concurring).

[20] Coglianese Panel (2021) at 4-5

that whether the actual cost of water paid by customers is "affordable" is a "function of the relationship between costs and means."[21]

Figure Intro-2. The Drinking Water and Sanitation Access Crisis

A shocking 2.2 million people in the U.S. are estimated to lack essential running water and indoor plumbing in their homes. Across the Southern Black Belt, backyards regularly flood with sewage. In Appalachia, families live by streams polluted with wastewater. In Puerto Rico, communities struggle to rebuild wastewater and septic systems damaged by hurricanes. Tribal nations frequently lack indoor plumbing, and communities from the Central Valley in California to Alaskan Native Villages struggle to provide adequate sanitation services to their residents. These public health and safety challenges are centered primarily, but certainly not exclusively, in small, rural communities that are not connected to standard municipal drinking water and sewer grids.

In the 1970s, the federal government provided 63 percent of capital spending on drinking and wastewater systems. This changed dramatically in the 1980s and continued for decades, with federal support shifting to loans that had to be repaid. For the small, rural communities historically without the resources to develop local water infrastructure, this decline in federal funding has made it all but impossible to catch up with the rest of the country.

The water and sanitation access challenges faced by these communities are serious and ongoing, notwithstanding more recent efforts to begin to address them. However, the analyses and interventions required to remedy the nation's water access crisis fall outside of the topics that EPA has outlined in the current EFAB charge to address the water affordability issues facing most of the country (capital financing, rate structure, SRF subsidies, consumer assistance plans, etc.). Most critically, a new level of federal and state financial support is required, specifically focused on small communities lacking water infrastructure. The smaller, primarily rural communities struggling to provide basic levels of drinking water and sanitation on a regular basis, are not in a position to adopt asset management plans or customer assistance programs when most or all of their community members are disadvantaged. Their issues are at an entirely different scale than those faced by most of the nation's water ratepayers and need to be addressed separately.

Sources: Dig Deep, Draining: The Economic Impacts of America's Hidden Water Crisis (2022); Dig Deep et.al, Closing the Water Access Gap in the United States: A National Action Plan (2019).

In response to the five-part affordability charge from EPA, EFAB has developed a high-level roadmap, or framework of considerations, for local water service providers, State SRF programs, EPA, and other agencies to consider in addressing local water affordability issues (Figure Intro-3). Discussions about how to make water more affordable for struggling consumers often begin and end with CAPs. As important as these programs are, affordability can be addressed at various levels from capital

[21] EPA: Drinking Water SRF DAC Definitions: A Reference for States at 5 (Oct 2022); see also, M. Teodoro, Water and sewer affordability in the United States: a 2019 update , Manuel P. Teodoro | Robin Rose Saywitz ("Affordability is a function of water prices relative to the prices of other things and the resources that customers have to pay for them."

investments to operations to rates to federal financial support. The framework reflects the concept that communities can address household water affordability at various points in their decision-making cycles as most appropriate for their community and ratepayer needs.

Figure Intro-3. EFAB Affordability Framework

The elements of this affordability framework are as follows:

- Capital Investments: The amount a customer pays for water is largely driven by utility investments in water infrastructure, i.e., what they build and how they build it. This paper discusses infrastructure alternatives and implementation alternatives that may be available to local utilities to provide meaningful cost savings over the long term.
- Operational Efficiency: Utilities have considerable flexibility in organizing their operations, and numerous resources have been developed to support utilities seeking to maximize operational efficiencies and limit ratepayer burdens where possible.

- Federal Financial Support: The federal government, and to some extent states, offer various financial support options for local water service providers, including grants, below-market-rate loans, principal forgiveness, other "additional subsidies," and more. EPA has a key role in ensuring that communities can maximize these opportunities.
- Rate Structures and Design: Many, although not all, water utilities have options for creating more equitable rate structures that can result in a reduced financial burden for low-income customers.
- Customer Assistance Programs: Even if all options above are optimized, there will be households in most communities unable to pay for essential water services either chronically or in response to unexpected crises. This paper identifies major barriers to CAPs as well as strategies and solutions for addressing these.

Sections 1-5 address each of these elements in turn.

Section 1 – Capital Investments

A primary cost driver for water services in most communities is capital investment in water infrastructure. Water infrastructure is the most capital-intensive utility to operate, with some analysts estimating it to be twice as capital-intensive as providing electricity and three times as capital-intensive as providing gas. Whether to address the needs of aging systems, make upgrades to comply with new regulatory requirements, address per- and polyfluoroalkyl substances (PFAS), or respond to the changing climate, utilities make infrastructure decisions every day that will impact ratepayers for decades to come. As many researchers and practitioners have recognized in recent years, there is an urgent need to connect local utility financial policies and decisions with household affordability.[22]

While the cost of conventional water infrastructure is rising at record rates, utilities increasingly have a wider array of alternatives to meet their safe drinking water, clean water, and stormwater management objectives, both in terms of the options they choose to invest in, as well as how they go about implementing those infrastructure decisions. With advances in water technology, use of new data, as well as green and nature-based infrastructure, communities are better positioned than in the past to develop water infrastructure portfolios that could be more affordable in the long run rather than defaulting to conventional systems and approaches that are often more expensive. This section first examines expanded water infrastructure options, and then alternative implementation approaches. Both may have substantial household affordability implications. In this regard, EPA has requested that EFAB:

> *. . . .conduct a high-level exploration of types of capital projects that could address local water service needs that are innately less burdensome on local ratepayers. For example, large-scale measures as an alternative to a more expensive new pipeline. This objective will not involve a comprehensive study of such alternatives but will address how consideration of infrastructure investment choices can be broadened to include unconventional options that are more affordable for the whole community while still solving for the water infrastructure challenges (e.g., water supply, treatment, stormwater capture, etc.). The deliverable would ideally include a survey of the types of capital projects that have already been shown to have substantial promise as alternatives and supplements to conventional water systems, such as green stormwater infrastructure and technologies aimed at reducing system leaks.*

While the approaches outlined in this section may often support affordability goals, it is important to provide several caveats. First, there certainly will be times when more expensive infrastructure investments and/or operational approaches may be needed for communities to address particular health, safety, reliability, or other local priorities notwithstanding significant adverse implications for affordability and/or utility financial capability. This Section I discussion is intended to expand consideration of water affordability beyond customer assistance programs to include infrastructure options that have not always been part of the equation and that could be financially beneficial for communities in comparison to default alternatives that may be more financially burdensome. We do

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[22] See, e.g., Teodoro, MP, Water and Sewer Affordability in the United States: A 2019 Update. AWWA Water Sci. (2020).

not suggest or imply that cost or affordability considerations should be the sole or primary driver in utility infrastructure decision-making, which must of course include an array of factors.

Second, there is an important distinction to be made between reducing the overall costs associated with capital investments and household affordability. For some utilities, as indicated in the case studies below, these savings and/or avoided costs can limit future rate increases, which can help to ease affordability concerns. However, some utilities may opt to repurpose these savings to invest in other areas that otherwise might have been deferred. In these cases, cost savings do not result necessarily in reduced bills for low-income households, but do provide more benefit for the rates that households pay.

1.1 Capital Investments: Affordable Alternatives to Conventional Infrastructure

Urban water infrastructure needs to perform three basic functions: (1) provide clean, safe, and reliable drinking water supplies; (2) treat and discharge wastewater safely without harming people or contaminating land or water resources; and (3) manage stormwater to prevent flooding and ensure that runoff to water bodies and ecosystems are not harmful to those resources or people.

Conventional centralized water infrastructure performs all these functions well and we have built a lot of it.[23] However, these single-purpose systems are less resilient in the face of climate change, the cost of upgrades, and emerging challenges. Technological and other innovations are making it possible, in the right circumstances, for utilities to invest in decentralized, One Water alternatives that integrate with built systems, and can result in substantial avoided costs and/or cost savings, potentially leading to greater affordability over time. By treating all water resources as assets to be employed, rather than waste to be disposed of, these alternative or hybrid approaches can also provide greater climate resilience and other co-benefits, which further supports affordability.

This report does not attempt to serve as a comprehensive survey of alternatives for providing drinking water, wastewater and stormwater services. It is intended instead to provide a high level review of categories of alternative approaches to water infrastructure, a number of illustrative case studies, and recommendations to EPA for gathering more data and other information to make the case to a broader set of utilities that these alternative ways of envisioning water infrastructure can provide a critical path toward lowering the cost of providing water services and ensuring the utility's fiscal health, while also providing broader community benefits such as greater climate resilience. The five approaches explored below are: (1) Water Use Efficiency as a Source of Water Supply; (2) Green Infrastructure as Stormwater Management; (3) Source Water Protection as Water Quality Infrastructure; (4) Optimization with Intelligent Infrastructure; and (5) Regionalization and Consolidation (for small communities).

[23] See, e.g. ASCE Water Infrastructure Report card (2021) https://infrastructurereportcard.org/cat-item/drinking-water-infrastructure/

1.1.1 Water Use Efficiency and/or Conservation as a Source of Water Supply

Cities, towns, and water utilities nationwide increasingly characterize water use efficiency measures as a source of water supply, in no small part because permanently reducing demand is often the least cost supply option.[24] These technologies can improve affordability of water infrastructure by enabling utilities to defer, or avoid entirely, new capital investments, reduce the scale of capital required to meet required levels of service, or reduce lifecycle costs through optimized operations and maintenance while also improving resilience and supply reliability. The EPA itself has developed an extensive and robust set of resources for local utilities regarding water use efficiency planning and programming, and has recognized that these programs can be remarkably cost-effective.[25] Numerous studies and case examples have demonstrated that water use efficiency can help reduce the level and/or pace of rate increases. A 2022 Pacific Institute study is illustrative:

> *Studies show that urban water conservation and efficiency measures are among the most cost-effective ways to meet water needs. For example, using data from over 800 utilities in California, Georgia, Tennessee, and Texas, Rupiper et al. (2022) estimated that real water losses ranged from 10 to more than 250 gallons per connection per day. They found significant opportunities to save water through pressure reduction and leak detection and repair at a cost of $277 per acre-foot of water saved, far less than the cost of developing new water sources. Likewise, Cooley, Phurisamban, and Gleick (2019) compared the levelized cost of water—which accounts for the full capital and operating cost of a project or device over its useful life—for various water supply and efficiency options in California. The authors found that water conservation and efficiency was less expensive than other water supply options, including stormwater capture, recycled water, and brackish and seawater desalination... They also found that some efficiency measures have a "negative" cost. For these measures, reductions in operation and maintenance (O&M) expense that accrue over the lifetime of the device exceed the cost of the water efficiency investment. This is especially true for efficiency measures that save customers energy but also for those that provide savings in labor, fertilizer or pesticide use, and reductions in wastewater treatment costs.*[26]

Utility investments at large scale that re-envision consumer demand reduction measures as water infrastructure – water efficient indoor appliances, smart meters, low water industrial processes, landscape changeouts, onsite reuse, and more – can in many circumstances result in substantial avoided costs for the utility. This can lower the overall cost of providing water services in comparison with more conventional infrastructure alternatives. At their best, demand reduction strategies are fully

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[24] See AWWA Policy Statement on Water Efficiency and Conservation (2018) ("**Conserved water should be viewed as a source of water** that provides multiple benefits (e.g. growth, environmental flows, expanded economic uses), equal in importance to the utilities' primary water source. In many cases, water conservation is the least cost option for a new source of supply.") (Emphasis added.)

[25] See, US EPA, Assistance that Saves: How WaterSense Partners Incorporate Water Efficiency into Affordability Programs. How WaterSense Partners Incorporate Water Efficiency into Affordability Programs.

[26] Pacific Institute, Advancing Affordability through Water Efficiency (Sept. 2022) at 9.

integrated with conventional built infrastructure planning and development and can be critical to ensuring that gray infrastructure is "right-sized" rather than over-built. Distributed, onsite efficiency installations and technologies are most effectively deployed across communities through various utility financial incentive programs tailored to different consumer types. In many cases, these incentive programs, whether rebate or direct installation programs, can be financed in the same ways that utilities have traditionally financed their conventional infrastructure (see Capitalizing Distributed Infrastructure sidebar below).

Figure 1-1. GASB 62: Capitalizing Distributed Infrastructure and Intergenerational Equity

Various water sector experts have observed that in order to fully realize the benefits of distributed water infrastructure – e.g., GSI, water use efficiency, water tech, private side lead service line replacement programs – service providers will need to invest in those programs at large scale by accessing the same source of financing they use for conventional infrastructure: capital markets.[27] This requires financing from the SRFs or other governmental loans or municipal bonds. However, most utilities limit funding for their conservation, efficiency, GSI and other distributed programs to operating cash (or the occasional grant). This approach limits the scale and reach of these programs even when they could be more cost effective than centralized infrastructure. Limiting financing for distributed systems to operating cash is thus "a negative incentive to instituting programs that have clear long-term benefit similar to other capitalized water resource investments."

One of the major barriers to debt financing for decentralized infrastructure on properties not owned or controlled by utilities has been the prevailing view that accounting standards require utilities to own or control the asset being financed. The accounting standards for public entities, including public water utilities, nationwide are established by the Governmental Accounting Standards Board (GASB). GASB has recognized that many public entities need to make long-term investments that do not necessarily produce conventional tangible assets, but that also are not properly characterized as "annual expenses" for accounting purposes. To address this, GASB developed Statement No. 62 (GASB 62) which allows public entities to book debt for investments that do not produce tangible assets within their ownership or control.[28] Under this approach, known as "Regulated Operations," business activities can be characterized as "regulatory assets" that public entities can borrow against. The "asset" is not the physical thing being capitalized (e.g., water efficient appliances, smart irrigation controllers, or bioswales); the asset is instead the guaranteed promise of repayment. **GASB 62 is thus a complete alternative to traditional capital asset accounting.**

[27] See, e.g., Ceres, Bond Financing Distributed Water Systems: How to Make Better Use of Our Most Liquid Market for Financing Water Infrastructure (2014).

[28] GASB. 2018. Implementation Guide No. 2018-1, Implementation Guidance Update — 2018. ¶¶ 4.4, 4.5, available at: https://tapin.waternow.org/wp-content/uploads/sites/2/2022/10/GASB_Implementation_Guide_No._2018-1.pdf.

Regulated Operations accounting is available to any public entity with a governing board legally authorized to: (1) set rates; (2) set those rates at levels to cover the cost of the specific programs to be financed; and (3) commit to setting rates in the future to pay for the cost of these programs. GASB 62 has been widely used in the energy sector, and GASB issued technical guidance in 2018 to clarify that water utilities, specifically, are authorized to use Statement 62 to book debt to pay for decentralized water system improvements, whether incentives or direct installations.

One of the key benefits of GASB 62 accounting is that it advances intergenerational equity by enabling utilities to spread the costs of distributed water infrastructure over the period of the benefits received. Funding these programs with only, or primarily, current operating revenue places the financial burden of these programs entirely on current ratepayers even though future ratepayers will reap their benefits. Ideally, from a sound financial planning perspective, the period of benefit should match the period of time that the benefit is being financed. Where decentralized systems are serving the same water supply, water treatment and stormwater management functions as conventional systems, it may often be in the community's interest to finance those strategies by accessing capital markets rather than limiting investment options to operating cash.

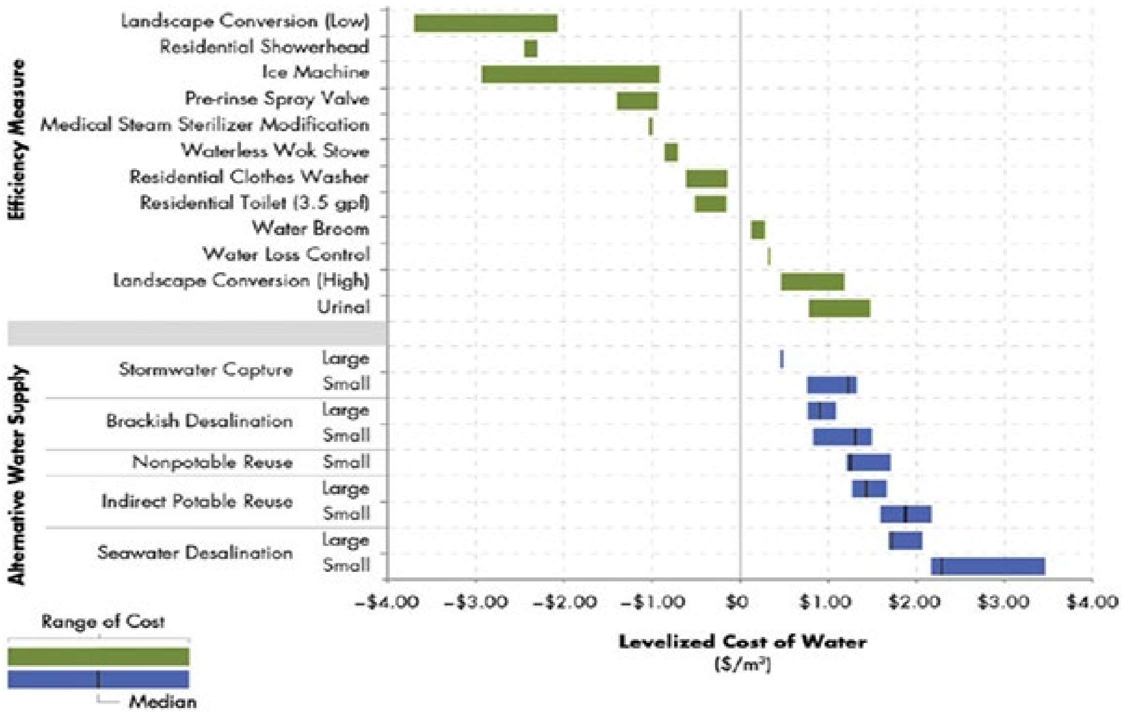
The Pacific Institute's 2022 study specifically tied utility investments in water conservation and efficiency to reduced long-term costs for ratepayers.[29]

> *When evaluating the long-term effects of conservation and efficiency on water costs, the key question is: "what would be the cost of water and wastewater in the absence of conservation?" Economists typically answer this question using an avoided cost analysis. An avoided cost analysis begins with selecting a baseline year that represents the year prior to investments in efficiency. Then, a hypothetical non-conserving scenario is developed in which the current population is multiplied by per capita water use (and wastewater generated) in the baseline year. The difference between water uses and wastewater production in the conserving and non-conserving scenarios represents the additional water and wastewater production needed in the absence of conservation. The capital and O&M for meeting the additional water and wastewater demands under the non-conserving scenario are then estimated. Finally, the effects on customer bills and connection fees are determined.*

The report includes data comparing the "levelized cost of water," which accounts for the full capital and operating cost of a project or device over its useful life, for various water supply and efficiency options in California. The authors found that water conservation and efficiency is less expensive than other water supply options, including stormwater capture, recycled water, and brackish and seawater desalination (Figure 1-2).

[29] Cooley, Heather, Morgan Shimabuku, and Christine DeMyers. 2022. "Advancing Affordability through Water Efficiency." Oakland, California: Pacific Institute (at 10).

Figure 1-2. Levelized Cost of Alternative Water Supplies and Efficiency Measures[30]



Source: Cooley, Phurisamban, and Gleick 2019

The report then summarized the avoided costs attributable to water efficiency investments and potential rate impacts for four western communities indicating that these programs have saved ratepayers hundreds of millions (Table 1-1).

[30] See Cooley, Shimabuku, and DeMyers (2022).

Table 1-1. Summary of Avoided Cost Estimates for Four Utilities in the Western United States

	City of Westminster (Feinglas, Gray, and Mayer 2013)		Tucson Water (Mayer 2017b)		Town of Gilbert (Mayer 2017a)		Los Angeles Department of Water and Power (Chesnutt, Pekelney, and Spacht 2018)	
Years Compared	1980	2010	1989	2015	1997	2015	1990	2016
Population	Not Reported		512,000	717,875	75,144	247,542	3,650,000	4,100,000
Water Use (gpcd)	180	149	188	130	244	173	180	110
Costs Avoided by Water Conservation and Efficiency Improvements								
Avoided Capital Costs	$591,850,000		$350,862,732		$340,807,075		$9,455,060,179	
Avoided Operations and Maintenance Costs	$1,238,000 per year		$29,387,158 per year		$3,671,346 per year		$1,600,448,745	
Bill Impacts without Conservation								
Additional Charges on Annual Customer Bills	$596		$133		$38		$13.48 per Hundred Cubic Feet	
% Increase in Customer Bills	91%		13.3%		6.1%		36.4%	
Additional Connection Fees	$16,952		Not Reported		$7,733		Not Reported	
% Increase in Connection Fees	80%		Not Reported		81.7%		Not Reported	

Notes: Water and wastewater costs are included for all agencies except the Los Angeles Department of Water and Power (LADWP). Avoided costs shown for Los Angeles are for water supply and do not include wastewater. Previous studies show that avoided costs for wastewater were at least as large as for water supply, suggesting that actual bill savings for water and wastewater would be at least twice as high as is shown in the table**.** LADWP uses an increasing tiered billing structure, and the estimate provided for additional charges on customer bills is for the Tier 4 billing rate.

Source: Cooley, Shimabuku, and DeMyers 2022

This reflects decades of experience indicating utility investments in these measures can bring down the cost of providing water supply, supporting the long-term fiscal health of the utility and building greater local affordability. The case studies below offer several tangible examples of the nexus between water use efficiency and the cost of providing water services.

Water Use Efficiency Case Studies

Case Study: San Antonio Water System's (SAWS's) Cheapest Source of Water – Conservation

San Antonio is nationally recognized for its achievements in water conservation. Water conservation has been a priority of the San Antonio community since the inception of the SAWS in 1992 when demand was 154 gallons per capita per day (gpcd). With a population of over 2 million people served by SAWS in 2023, a total per capita demand of 154 gpcd would require an additional 96,000-acre feet of water annually. Gains in water conservation have offset the need for additional water supply projects and avoided the need for charges in SAWS water rates to implement those projects.

Conservation programs such as rebates for low-flow indoor water fixtures and Plumbers to People to assist low-income homeowners with leak repairs, have helped bring indoor water use to below 45 gpcd in 2021. Indoor water use is expected to continue to decline with the assistance of Advanced Metering Infrastructure (AMI) technology, which will identify continual water usage, further reducing overall residential demand.

For example, SAWS began notifying customers through email text alerts and automated dialer of continuous hourly use once an AMI meter was installed. Once notified, customers are quick to respond, lowering their water use as shown in Figure 1-3 below.

Figure 1-3. San Antonio Use History

After receiving an AMI powered watering notification, daily water use decreases.

SAWS also has a robust suite of outdoor programs, including WaterSaver Irrigation Consultation and Landscape Coupons, Outdoor Living Rebates and Irrigation Design Rebates for both residential and commercial customers. From 2018 to 2022, nearly 1.3 million square feet of high-water use grass was removed and replaced with low-water use landscape plants as part of the WaterSaver Landscape Coupon program.

While the conservation programs have been very successful in reducing water demand, thus lowering customer bills and delaying the need to for additional water supplies, SAWS will continue its conservation message through the use of its current programs and enhancements offered through use of the AMI technology.[31]

[31] Additional information on the SAWS Conservation Program can be found in SAWS' Five-Year Water Conservation Plan: www.saws.org/conservation/conservation-conservation-plan.

Case Study: Spanish Fork, Utah

Spanish Fork is a fast growing, primarily residential community of approximately 43,000 situated in central Utah with relatively limited water supply sources. In the 2010s, the City was experiencing challenges meeting its peak demand during the day and decision makers grew concerned that demand would soon exceed the capacity of the City's current water system.

This led to a decision to take a conservation-first approach and avoid purchasing additional costly water rights or invest in new reservoirs.[32] In light of significant use of potable supply for outdoor landscaping, the City decided to invest in smart irrigation controllers for residents at a large scale. Starting in 2018, Spanish Fork began providing free, professionally installed smart irrigation controllers to residents who met certain requirements. The controllers allow wireless and remote operation of outdoor irrigation systems based on customizable zones tailored to specific vegetation types and sun exposure and hyperlocal weather monitoring to prevent over watering, among other features, i.e., "weather intelligence." This reduces overall water use by enabling users to irrigate at optimal times. The City provided residents with watering schedules at different time intervals organized by address and wind speeds to minimize peak demand on the water system. The schedules were also designed to be convenient and reasonable for residents, and homeowners could opt out of the schedule if desired, although most participants chose to stay on the recommended schedule. Residents with smart controllers saw reduced pressurized irrigation by about 17 percent on average when compared to homes without a smart irrigation controller. On a citywide basis, the program allowed Spanish Fork to avoid purchase of additional water rights and water system capacity. The City estimated that for every six households with a smart controller, one new household could be added without the need for additional water system capacity.

Case Study: Gilbert, Arizona

Utility investments in water conservation and efficiency between 1997 and 2015 reduced local water use from 244 gpcd to 173 gpcd, and wastewater discharge from 72 gpcd to 57 gpcd. A 2017 study estimated that these reductions resulted in avoided costs of $341 million in capital costs for water and wastewater infrastructure and an additional $3.67 million per year in operating costs. In the absence of efficiency, combined water and wastewater bills would have been 6.1 percent higher ($657 compared to $619 per year) and connection fees 82 percent higher ($17,000 compared to $9,500).[33]

Case Study: Los Angeles, California

Beginning in the 1990s, per capita water use in Los Angeles steadily declined from an average of about 180 gpcd prior, to about 110 gpcd by 2016. Chestnutt et al. (2018) found that reductions in per capita water use allowed the City of Los Angeles to avoid additional water supply, water treatment, and pumping costs totaling more than $11 billion between 1990 and 2016. "In the absence of water conservation and efficiency, customer water bills would have been more than 36% higher. Water

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[32] Conservation efforts were also driven by Spanish Forks' desire to not only meet but exceed Utah's statewide goal of reducing water use by 25% by 2025. See, Tap into Resilience Spanish Fork Case Study.

[33] Cooley, H., Shimabuku, M., & DeMyers, C. (2022). Advancing Affordability through Water Efficiency. *Pacific Institute* (at 11).

conservation and efficiency also avoided wastewater costs and paying for these costs would have increased customer bills even more."[34]

Case Study: City of Westminster, Colorado

Westminster is a Front Range town with a population of just under 120,000 and a long history of investment in water use efficiency efforts. Conservation staff undertook an examination of the financial impact that its water conservation programs had had from 1980-2010, framing its inquiry with the following question: "What would our water rates and tap fees be today if per customer water demands remained unchanged since 1980?" 1980 was chosen because it predated City related conservation programs and two levels of plumbing code related changes. Average water use in 1980 was about 180 gpcd, and had declined to149 gpcd in 2010. Westminster attributes this change to a combination of the utility's own water conservation programs; the City's inclining block and seasonal rate water billing structure; and national plumbing codes resulting in a measure of "passive conservation." The analysis concluded that in the absence of the 21 percent decrease in demand, Westminster would have been required to secure an additional 7,295 acre-feet (AF) of water supply in order to meet the customer demand while satisfying the City's reliability requirements; and further estimated that obtaining and delivering the required additional 7,295 AF of water would have required a capital investment of $218.85 million. Failure to reduce demand would also have required additional treatment capacity. The City estimated that its avoided capital costs in this regard came to approximately $130 million.[35]

1.1.2 Green Infrastructure as Stormwater Management

Cities nationwide have been deploying nature-based, GSI[36] strategies to capture urban runoff for the last twenty years or more, although mostly at a relatively small scale. Permeable pavers, bioswales, engineered rain gardens, urban forests, green roofs, and more have proven to be remarkably effective at capturing, or at least slowing, stormwater runoff and contaminated discharges into the nation's waterways. These approaches can also reduce combined system overflows (CSO) and localized urban flooding. The efficacy of GSI is underscored by the fact that the U.S. Congress has explicitly endorsed

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[34] Cooley, H., Shimabuku, M., & DeMyers, C. (2022). Advancing Affordability through Water Efficiency. *Pacific Institute* (at 11).

[35] Cooley, H., Shimabuku, M., & DeMyers, C. (2022). Advancing Affordability through Water Efficiency. *Pacific Institute* (at 11).

Feinglas, Stuart, Christine Gray, and Peter Mayer. 2013. "Conservation Limits Rate Increases for a Colorado Utility: Demand Reductions Over 30 Years Have Dramatically Reduced Capital Costs." Chicago: Alliance for Water Efficiency. https://www.mwdh2o.com/media/16208/conservation-limits-rate-increases-for-a-colorado-utility.pdf (at 2-4).

[36] "Green infrastructure" as defined by the Clean Water Act "means the range of measures that use plant or soil systems, permeable pavement or other permeable surfaces or substrates, stormwater harvest or reuse, or landscaping to store, infiltrate, or evapotranspirate stormwater and reduce flows to sewer systems or surface waters." PL 115-436 (Jan. 14, 2019, Sec. 5(a). Green infrastructure includes bioretention, tree boxes, bioswales, green streets, conservation areas, and permeable pavements. Municipalities can combine these practices with gray infrastructure to help manage stormwater and provide multiple benefits such as open space, habitat creation, resilience, and improved aesthetic " US EPA, Long Term Stormwater Planning: A Voluntary Guide for Communities (2022)

GSI as a key stormwater management strategy; first in the American Recovery Act of 2009, which requires all CWSRF programs to use a portion of their federal grants for projects that address GSI, water and energy efficiency, or other environmentally innovative projects;[37] and then again in recent CWA amendments, requiring EPA to promote the use of GSI in stormwater permitting under the CWA and more broadly as a means of reducing pollution, protecting water resources, and achieving environmental, public health and community goals.[38]

From an affordability perspective, GSI strategies can be less expensive than conventional centralized stormwater infrastructure alternatives. GSI can also be implemented incrementally, allowing utilities to adapt more cost-effectively to conditions associated with climate change – for example, by delaying or reducing the need to upgrade existing drainage networks to accommodate larger storm events. EPA has recognized GSI often results in lower capital costs for water systems,"[39] and that "green infrastructure controls can cost less than conventional controls; and green-gray approaches can reduce public expenditures on stormwater infrastructure."[40] Indeed, EPA has stated that:

> *Green infrastructure costs less than conventional gray infrastructure, provides green jobs and reduces municipal water usage and cooling costs**. At the household level, this can result in increases in available income for preventative healthcare, healthy foods, and adequate housing**, all of which have proven health benefits and contribute to overall health and well-being.*[41]

Thus, to the extent that GSI may be able to play a meaningful role in addressing communities' stormwater challenges, it could be advantageous from an affordability perspective for utilities to make greater use of GSI options.

There are various examples nationwide of how GSI has benefitted utilities, although it may not always be the lowest cost option. However, green infrastructure can provide multiple benefits where

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[37] https://www.epa.gov/cwsrf/green-project-reserve-guidance-clean-water-state-revolving-fund-cwsrf

[38] Specifically, the Water Infrastructure Improvement Act of 2019 provides that EPA: "[S]hall promote the use of green infrastructure in, and coordinate the integration of green infrastructure into, permitting and enforcement under [the CWA], planning efforts, research, technical assistance, and funding guidance of the [EPA]." Sec. 519 (a). The GSI promotion amendments further provide that EPA: "[S]hall ensure that the Office of Water coordinates efforts to increase the use of green infrastructure with (1) other federal departments and agencies; (2) state, tribal, and local governments; and (3) the private sector." Sec. 519(b) Section 519(c) further requires all of EPA's regional offices to "promote and integrate the use of [GSI] within the region including through" outreach and training, incorporating GSI into permits and other regulatory programs and consent decrees.

[39] https://www.epa.gov/green-infrastructure/benefits-green-infrastructure#:~:text=Private%20and%20Public%20Cost%20Savings,%2C%20paving%2C%20and%20landscaping%3B%20and

[40] https://www.epa.gov/green-infrastructure/benefits-green-infrastructure#:~:text=Private%20and%20Public%20Cost%20Savings,%2C%20paving%2C%20and%20landscaping%3B%20and

[41] US EPA, Healthy Benefits of Green Infrastructure in Communities (2017) (emphasis added).

intentionally designed to do so. When GSI projects are developed to meet multiple objectives (e.g., water quality and water supply), and/or are integrated into planned infrastructure improvements (e.g., planned transportation/street upgrade projects), this can result in cost savings overall, compared to a siloed approach. GSI can also be implemented in targeted ways that result in benefits for underserved populations. Examples include targeted implementation to reduce localized flooding or provide a cooling effect in areas with little vegetation. This does not necessarily result in a lower household bill for water services but does provide tangible additional benefits.

GSI Case Studies

Case Study: Milwaukee Metropolitan Sewerage District (MMSD)

Milwaukee sits on the shore of Lake Michigan at the confluence of three rivers in a region that receives on average 35 inches of rain per year; 1 inch of rain locally generates 7.1 billion gallons of stormwater across the service area. MMSD is a regional agency responsible for wastewater treatment and flood management services for over 1 million people in the Greater Milwaukee Area. MMSD receives wastewater flows from both combined and separate sewer systems. Sewer and stormwater system overflows were constant in the area for many years leading to the development of Milwaukee's Deep Tunnel System, completed in 1993.[42] While the Deep Tunnel system was effective in slashing CSOs, the problem was not fully eliminated. In the early 2000s MMSD decided to include a major investment in GSI in its stormwater management portfolio, in large part because it determined that GSI would be more cost effective than constructing an additional CSO tunnel.[43] At the time (2013), MMSD estimated that it would save $44 million in infrastructure costs by using a green approach. In the aggregate, MMSD expects green infrastructure to capture and store 740 million gallons of stormwater per storm event; for context, the Deep Tunnel holds 521 million gallons of water.[44]

Case Study: Lancaster, Pennsylvania

Lancaster, a community of about 60,000 people, turned to GSI to address its CSO and MS4 (Multiple Separate Stormwater System) challenges and to reduce capital investments in gray infrastructure and associated wastewater pumping and treatment costs. Its Comprehensive Green Infrastructure Plan, adopted in 2011, was estimated to reduce gray infrastructure capital costs by $120 million and to reduce wastewater pumping and treatment costs by $661,000 per year. Per EPA's report on this initiative:

> *These benefits exceed the costs of implementing green infrastructure in the CSS area, which were estimated to range from $51.6 million if green infrastructure projects were integrated into planned improvement projects to $94.5 million if green infrastructure projects were implemented as standalone projects. Across the entire city, the Green Infrastructure Plan was*

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[42] Tap into Resilience, Milwaukee Municipal Sewerage District Case Study

[43] See, K. G. Hopkins et al, "Influence of Governance Structure on Green Stormwater Infrastructure," Env. Sci & Policy, Vol. 84 (June 2018).

[44] Tap into Resilience, Milwaukee Municipal Sewerage District Case Study; MMSD Regional Green Infrastructure Plan (2013).

> *estimated to provide approximately $4.2 million in energy, air quality, and climate related benefits annually. In addition, the Green Infrastructure Plan is expected to reduce gray infrastructure costs in both the CSS and MS4 areas.*

While cost reductions in the MS4 area were not included in this analysis, accounting for the reduced cost of green infrastructure in the MS4 area would increase the value of avoided costs beyond the $120 million estimated for the CSS area only. These benefits would be achieved at an estimated cost of $77 million if green infrastructure were integrated into planned improvement projects to $141 million if green infrastructure were implemented as standalone projects. In both the CSS and MS4 areas, the environmental and economic benefits provided by green infrastructure would continue to accrue year after year.[45]

The City's 2023 "Green It Lancaster" report indicates that the program remains a centerpiece of the City's stormwater management efforts: "Given the expense of gray infrastructure modifications (such as increasing the capacity of the City's wastewater conveyance and treatment infrastructure; adding storage or holding tanks to detain wastewater flows until treatment capacity returns; or providing some form of wastewater treatment to the overflow discharges), the City has decided to also utilize "green infrastructure" methods of stormwater management."[46] The report indicates the City has made GSI implementation "a core part of its Public Works activities as roads, alleys, parks and other public infrastructure" are restored or upgraded.

1.1.3 Source Water Protection as Water Quality Infrastructure

Another form of decentralized green infrastructure involves protecting the watershed lands that produce some or all of a municipality's water supply. New York City has famously protected more than 1 million acres of mostly forested source water lands in the Catskills through purchase and/or conservation easements to ensure protections for source water quality for well over a century.[47] New York has estimated that these programs have saved ratepayers at least $10 billion in filtration plant construction costs alone.[48] Similarly, Salt Lake City began efforts to protect the Wasatch Range in the early 20th century, in part by appealing to President Teddy Rosevelt who limited mining and grazing on watershed lands in order to protect local drinking water quality.[49] A 2016 World Resources Institute study of source water investment programs in the U.S. found that benefits accruing to water utilities included avoided or reduced costs of infrastructure upgrades or expansion, reduced costs of water

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[45] https://19january2021snapshot.epa.gov/sites/static/files/2015-10/documents/cnt-lancaster-report-508_1.pdf

[46] https://www.cityoflancasterpa.gov/wp-content/uploads/2023/09/GREENIT_LANCASTER_FINAL_withAppendices_022519.pdf

[47] https://catskillsvisitorcenter.org/catskills-watershed-resources/#:~:text=The%20Catskill%20and%20Delaware%20Systems,water%20supply%20in%20the%20U.

[48] https://www.nyc.gov/html/dep/html/press_releases/11-11pr.shtml#:~:text=The%20Land%20Acquisition%20Program%20has,%2410%20billion%20in%20filtration%20plant

[49] https://www.slc.gov/utilities/watershed/

system operations and maintenance, reduced regulatory risks, and reduced cleanup and revitalization costs during and after catastrophic fires.[50] The report cited another study demonstrating that seven U.S. cities "avoided between $725,000 and $300 million in annual water treatment costs, and between $25 million and $6 billion in capital costs, by investing in the protection and sustainable management of watersheds that deliver urban water supplies."

> *When conventional infrastructure measures are combined with sustainable management of natural infrastructure, they can reduce utility operation costs, improve water system performance, increase predictability of water supply, and generate ecosystem services for the enjoyment of communities in the watershed (Forster and Murray 2001; Freeman et al. 2008). In particular, natural infrastructure may have cost-saving potential for utilities by preventing sediment buildup in reservoirs, thereby reducing capital, maintenance, and variable costs for water treatment (Freeman et al. 2008).[51]*

The case studies below offer several examples of utilities investing in watershed health and protection and potential cost saving benefits.

Source Water Protection Case Studies

<u>Case Study: Denver Water</u>

Denver Water is the largest water provider in Colorado serving a population of roughly 1.5 million across the metropolitan area. It collects rain and snowmelt from 2.5 million acres of mountains and foothills west of Denver through a complex network of tunnels, pipelines, and canals. The health of these forest lands, mostly owned by various federal, state, and local agencies, is vital to the reliability and quality of the utility's water supply. When sediment and debris are destabilized by fire and/or storm events, water quality can be severely degraded and built infrastructure damaged. Two catastrophic fires in recent decades, followed by intense rain events, were "a turning point" in the utility's water management.[52] Without healthy vegetation to retain the rainfall, mass amounts of debris and sediment severely impacted local reservoirs costing millions to remediate. Since 2010, Denver Water has collaborated with the United States Forest Service and other partners on its From Forests to Faucets program, an effort to invest strategically in proactive forest management to protect municipal water quality. The goal is to "restore the resilience of more than 120,000 acres of forested lands in priority watersheds." The utility is clear about the fiscal benefits of this approach:

> *Forests must be cared for over time to sustain this valuable function. Proper forest management helps to enhance the resilience of forests to wildfire, insects and disease. Denver Water invests*

[50] See World Resources Institute, Protecting Drinking Water at the Source: Lessons from United States Watershed Investment Programs (2016) Benefits to other stakeholders included recreation, habitat protection, rural income, avoided cost of firefighting, and avoided damages to homes from fire and post-fire flooding.

[51] World Resources Institute (2016) (at 17).

[52] https://storymaps.arcgis.com/stories/6ef2af96207046baa8451cf20def46cb

> *in proactive forest management because it is the most efficient and cost-effective strategy to protect its water supply.*[53]

Case Study: Central Arkansas Water

Central Arkansas Water is a public drinking water utility serving a population of approximately 500,000 people.[54] The utility's primary water sources are two local reservoirs, and in 2007 it made land conservation a key component of its approach to water quality management. To this end, Central Arkansas established a goal of protecting 1,500 acres of watershed land by paying private landowners for conservation easements that either limit activities that could adversely impact source water or buying land outright.[55] A review of the Central Arkansas program indicated that it was developed "in response to a risk of increasing water treatment costs linked to forest loss and degradation in its source watershed" and further noted:

> *Increasingly, community leaders are looking for more cost-effective and durable solutions to water management. Rather than rely solely on built infrastructure systems, they are incorporating "green" approaches that harness or mimic nature's own processes, such as by conserving forests that are the source of drinking water and maintaining natural floodplains to lessen the impacts of storms. Experience shows that when paired with traditional infrastructure, natural infrastructure—wetlands and forests—can reduce water management costs and deliver other cultural and economic benefits coveted by twenty-first century communities, like recreational green spaces and fish and wildlife habitats. The retrospective and prospective studies of the costs and benefits of watershed protection analyzed a range of financial benefits that accrue to utilities and other stakeholders. Benefits to water utilities included avoided or reduced costs of infrastructure upgrades or expansion, reduced costs of water system operations and maintenance, reduced regulatory risks, and reduced cleanup and revitalization costs during and after catastrophic fires.*[56]

As of 2022, Central Arkansas Water had purchased over 5,000 acres of property with an additional 295 acres under conservation easements.[57] A 2015 analysis by Earth Economics estimated that Central Arkansas' land purchases and conservation easements would result in upwards of $90 million per year

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[53] https://storymaps.arcgis.com/stories/6ef2af96207046baa8451cf20def46cb

[54] Central Arkansas Water, a public utility, is the largest drinking water utility in the state providing drinking water to communities in eight counties including Little Rock, North Little Rock, Alexander, Cammack Village, College Station, Sherwood, Wrightsville, and Un- incorporated Pulaski County. *About Us*, CENT. ARK. WATER, https://carkw.com/about/; *see also* ARK. CODE ANN. § 25-20-301 (2010).

[55] American Rivers, *Source Water Protection – What It Is and How to Fund It*, YOUTUBE (Sept. 27, 2017), https://www.youtube.com/watch?reload=9&v=t65jF1btUEE

[56] World Resources Institute, Protecting Drinking Water at the Source (2016)

[57] *Central Arkansas Water is First in World with Certified Green Bond To Protect Drinking Watershed For Water Quality*, CENT. ARK. WATER (Mar. 15, 2021), https://carkw.com/news/announcements/central-arkansas-water- is-first-in-world-with-certified-green-bond-to-protect-drinking-watershed-for-water-quality; see also https://carkw.com/site/assets/files/4573/caw-045_green_bond_report_final.pdf

in water quality, conveyance, and supply benefits to the utility, as well as more than $360 million annually in co-benefits including improved air quality, recreation, and wildlife habitat.[58]

Case Study: Medford, Oregon

The City of Medford, Oregon analyzed three options for meeting temperature Total Maximum Daily Load requirements. It determined that riparian restoration was the most cost-effective, compared to wastewater discharge to lagoon storage and mechanical chillers. The City is engaged in a water quality trading program to improve and protect the quality of the Rogue River, which is used as a supplemental drinking water source for the City.[59] [60]

1.1.4 Optimization with Intelligent Infrastructure

Utilities around the U.S. are in the early stages of a transition to smart water infrastructure, which involves integrating intelligent technologies into water infrastructure systems. To address a utility's strategic objectives, smart water systems graft sensing and control, data collection and communication, data management and display, and data fusion and analysis technologies onto physical assets.[61] Some utilities have even adopted 'digital twins,' which are "dynamic digital representations of real-world entity(s) and their behaviors using models with static and dynamic data that enable insights and interactions to drive actionable and improved outcomes."[62] Benefits of smart water technologies include improving the "efficiency, longevity and reliability of a utility's physical assets by measuring, collecting, and analyzing data, and enabling action to respond to a wide range of network events."[63]

Like the nature-based and other distributed infrastructure strategies described above, intelligent infrastructure can improve the affordability of water infrastructure by enabling utilities to (1) defer new capital investments, (2) reduce the scale of capital required to meet required levels of service, or (3) reduce lifecycle costs through optimized operations and maintenance. For example, utilities and their consulting partners often struggle to plan for the future given ever changing regulatory requirements,

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[58] Earth Economics. THE ECONOMIC VALUE OF THE LAKE WINONA AND MAUMELLE WATERSHEDS (2016)

[59] AWWA. 2018. Source Water Protection Justification Toolkit. https://wvawwa.com/wp-content/uploads/2019/06/source-water-protection-justification-toolkit-awwa.pdf (pg. 18)

[60] Bond, Julia. 2014. Water Quality Trading Program Requirements and Monitoring. Presentation Poster, A Community on Ecosystem Services (ACES) 2014 Conference. Available on-line at: https://conference.ifas.ufl.edu/aces14/posters/Bond,%20Julia.pdf

World Resources Institute. 2013. Gartner, T., Mulligan, J., Schmidt, R., and J. Gunn (Eds.). Natural Infrastructure: Investing in Forested Landscapes for Source Water Protection in the United States. Available on-line at: https://wriorg.s3.amazonaws.com/s3fs-public/wri13_report_4c_naturalinfrastructure_v2.pdf. See also: https://www.thefreshwatertrust.org/case-study/medford-water-quality-trading-program/

[61] SWAN Forum. "An Overview of Smart Water Networks." *Journal of the American Water Works Association*, 106:7 p68, 2014. https://swan-forum.com/wp-content/uploads/2023/08/AWWA_An-overview-of-smart-water-networks_July-2014.pdf

[62] SWAN Forum, "Digital Twin Work Group," accessed at https://swan-forum.com/digital-twin-work-group/

[63] SWAN Forum, "What is a Smart Water Network," accessed at https://swan-forum.com/smart-water-network/

weather conditions, population models, emerging contaminants like PFAS, and advances in treatment technology. Time and budget constraints also limit how many alternatives can be realistically considered in project development. The new digital tools are beginning to change the game, including in particular the application of generative artificial intelligence (GenAI). By rapidly developing engineering options that satisfy design objectives, GenAI platforms can significantly expand the solution set facing utilities, producing designs at significantly lower cost.

The potential cost-saving benefits of digitizing water infrastructure are now well understood. As the International Water Association notes, "digital solutions have an impact on increasing capital efficiency. Example digital solutions include algorithmic and *in situ* leak detection technologies that result in targeted pipe replacement and real-time digital twins of the wastewater collection network to optimize existing assets and avoid capital-intensive construction projects."[64] Analysis by Global Water Intelligence estimates that implementation of digital solutions in water and wastewater utilities could reduce global capital investment requirements by 10 percent or more, or over $150 billion per year.[65] The US Water Alliance notes that "adoption and implementation of digital solutions" is a "vital pathway to help small and rural communities advance water equity, access, and resilience." EPA has explicitly identified these technologies as important opportunities to build more efficient and resilient systems.[66] Bills reflecting bi-partisan support for accelerating adoption of digital utility technologies, such as the *Water Infrastructure Modernization Act,* have also been introduced on the floor of Congress.

The case studies below offer tangible examples of how the application of digital solutions have helped utilities achieve substantial cost savings while maintaining or improving upon performance objectives, improving affordability.

Case Study: Moulton Niguel Water District

Moulton Niguel Water District is a special district providing drinking water, recycled water, and wastewater treatment services to 172,000 people in Orange County, California, roughly 45 miles southeast of Los Angeles. Annual precipitation averages approximately 14 inches, with close to zero precipitation in the summer months. In 2018, the District was considering a significant investment in new storage infrastructure to meet summer peak demand. However, the utility instead partnered with a data expert to develop an advanced demand forecasting tool. The tool enabled the District to analyze its usage data in an entirely different way, revealing that the peak demand issue could be addressed by working with some of the District's larger institutional customers to change the timing of their

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[64] Digital Water: Industry Leaders Chart the Transformation Journey. IWA, 2019. Accessed at https://iwa-network.org/wp-content/uploads/2019/06/IWA_2019_Digital_Water_Report.pdf

[65] Global Water Intelligence. "What is Driving Water Investment?" White Paper prepared for Legal & General Investment Management, October 2019. Accessed at https://www.lgim.com/landg-assets/lgim/_document-library/etf/gwi_white_paper.pdf

[66] US EPA. "Investing in Intelligent Technology: Facing Today's Wastewater Challenges with the Future in Mind."

operations. These operational changes eliminated entirely the need for the proposed reservoir, saving ratepayers almost $20 million in capital investments in addition to substantial ongoing O&M costs.[67]

Case Study: South Bend, Indiana

Prior to 2008, virtually every time it rained heavily, South Bend faced sewer overflows into the St. Joseph River because the City's aging sewer system could not handle the excess discharge, an average of 1-2 billion gallons annually. In 2012, the City entered into a federal consent decree, agreeing to a long-term control plan (LTCP) of their sewer overflow estimated at $713 million in capital improvements plus financing costs. For South Bend, with a population of just over 100,000, this equated to a significant burden per citizen, which was economically unfeasible given the average annual household income of about $32,000.

In 2021, the Department of Justice and EPA endorsed the City's updated LTCP requiring 60 percent less infrastructure investment than originally estimated, saving the City approximately $400 million in capital expenditure spending. As the Department of Justice noted at the time:

> *South Bend was able to develop the revised plan in large part because it installed more than 150 "smart" sensors at more than a hundred locations in its sewer system to allow it to better monitor and manage its flows. This "smart sewer system" enables South Bend to construct fewer and smaller-sized gray infrastructure measures and, at the same time, achieve a greater level of pollution control.*[68]

Since implementing its smart sewer program, dry weather overflows have been eliminated and combined sewer overflow volumes have been reduced by more than 80 percent, or roughly one billion gallons per year. South Bend has also enjoyed approximately $1.5 million in annual operating and maintenance cost savings. In addition, *E. coli* concentrations in the St. Joseph River have dropped by more than 50 percent on average, improving the water quality.[69]

Case Study: Costa Mesa Optimized Asset Lifecycle Management

Replacement of aging infrastructure is one of the principal capital expenditures facing most water and wastewater utilities. Finding ways to reduce that expenditure while maintaining levels of service is a critical lever in maintaining or improving ratepayer affordability. For example, many utilities schedule pipe replacements based on the age of each part of the network to minimize the risk of water main breaks. However, pipes do not deteriorate at a uniform rate, so an age-based approach to pipe

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[67] Tap into Resilience, Moulton Niguel Case Study (2019).

[68] US Department of Justice. "Department of Justice, EPA and Indiana Amend Agreement with the City of South Bend, Indiana to Treat Sewage and Wastewater." Press release, August 20, 2021. Accessed at https://www.justice.gov/opa/pr/justice-department-epa-and-indiana-amend-agreement-city-south-bend-indiana-treat-sewage-and.

[69] "Utility reduces CSO volume by 80%," Xylem case study. Accessed at https://www.xylem.com/en-us/support/case-studies-white-papers/south-bend-indiana-reduces-combined-sewer-overflow-80-percent-saves-400-million/

replacement can lead to inefficient capital deployment, replacing many pipes with substantial remaining useful life while leaving in place pipes at higher risk of failure.

Digital technologies and approaches can now enable a more efficient way to implement capital-intensive water infrastructure programs. Intelligent condition assessment tools, coupled with artificial intelligence technologies, can estimate probability of failure for each pipe segment, couple that information with estimates of consequence of failure, and generate a data-drive prioritization for pipeline replacement. With such a prioritized program, utilities can achieve significant reductions in risk with less capital expenditure.

Thus, Costa Mesa Water District in Southern California implemented a condition assessment program to determine the remaining useful life of its pipelines. Asbestos cement pipe was the primary focus of the testing program. The District estimates that it will avoid spending $231 million on unnecessary pipe replacement over the next 30 years.[70]

Case Studies: Where GenAI Has Lowered the Cost of Capital Project Design

As indicated above, GenAI has substantial cost saving potential for water utilities as demonstrated by two inter-national examples:

- BRK, a private Brazilian utility, utilized Transcend, a GenAI platform to transform project evaluation, reducing conceptual plant design cost by 80 percent, and cutting planning time from two months to less than one week, while generating 8-10 more options per facility.
- A Bangladeshi utility used this generative design capability to reduce the footprint of planned plant construction by 25 percent, significantly reducing capital costs.

As the Asian Development Bank notes, "advanced AI optimization tools give insight on the most efficient configurations based on cost minimization (CAPEX plus discounted OPEX) or any other selected target. Dedicated AI algorithms can identify optimal alternatives for network expansions. They take into consideration the uncertainty of some design parameters, such as population forecast and spatial urban growth to support a more robust approach to decision making."[71] Based on experience to date, it appears that the digital automation of solution set development can optimize the up-front and lifecycle costs of infrastructure designs, supporting affordability through the consideration of a fuller range of feasible choices.

Case Study: Park City, Utah Optimized Capacity Planning

Park City, Utah is a mountain community in the Wasatch Range requiring the municipal water utility to pump drinking water uphill from 6,000 feet to just under 10,000 feet, with a complex network of pressure zones, pressure reducing valves, and pump stations to service the community. Beyond being a popular ski destination, every January thousands of movie fans arrive in the city for the Sundance Film

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[70] "Pipeline Integrity Testing to Assess the Useful Life of Pipeline Infrastructure." AWWA Journal, September 2019. https://doi.org/10.1002/awwa.1358

[71] "Using Artificial Intelligence for Smart Water Management Systems." *ADB Briefs*, June 2020. Accessed at https://www.adb.org/sites/default/files/publication/614891/artificial-intelligence-smart-water-management-systems.pdf

Festival swelling the local population by nearly 300 percent over the course of peak season. With a highly variable population, unpredictable water supply, and a challenging topography, managing operations and planning is a demanding task that Park City's water services team manages by staying at the forefront of technology.

Specifically, the City implemented an AMI network that provides near-real time data on water consumption across the entire network enabling management to optimize long-term capital planning. Before implementing AMI, the city's planning process would size future infrastructure needs based on assumptions of consumption growth that were derived by dividing tank zone inputs by the number of residential equivalents, then forecasting consumption growth using the same coefficient. With AMI data, planners can develop demand growth estimates based on real demand derived from daily AMI data. This helps to right-size future capital projects and identify where addressing loss in an area is a more cost-effective solution vs. upsizing infrastructure.

The data from the AMI network also enables the management team to assess demand, identify areas of the network with greater water losses, and drive decision-making about maintenance and repairs, all of which can also contribute to reduced costs. For example, the management team uses consumption and loss data to calculate the least disruptive time windows when they can take a tank offline for maintenance and repair.

1.1.5 Regionalization and Consolidation of Water Infrastructure for Small Utilities

As indicated above, the vast majority of the nation's 50,000 drinking water utilities serve populations of 10,000 or less, and thus in these communities, a small number of people often shoulder the cost of significant capital investments in water infrastructure. Water infrastructure benefits from economies of scale, so regional cooperation between small water utilities can, in the right circumstances, increase affordability by enabling communities to spread costs over a larger base of ratepayers. Sharing treatment plants, distribution infrastructure, and wastewater treatment plants means that utilities can leverage shared capital investments rather than building separate, costly, sub-scale facilities. These benefits have been extensively documented by EPA and other organizations such as the US Water Alliance[72], the Rural Community Assistance Partnership,[73] and others.

<u>Case Study: Montrose, Illinois</u>

The Village of Montrose has made it a priority to keep water and wastewater rates affordable. However, when they realized they needed to refurbish the village's water plant and undertake a number of wastewater system improvements, they also found that doing so would have required an 85 percent increase in rates, too expensive for the residents to afford. The village's board applied instead for a grant to connect to neighboring EJ Water, a nearby not-for-profit, member-owned utility. Under the terms of the agreement, Montrose residents will avoid the 85 percent rate increase, and EJ Water will

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[72] https://uswateralliance.org/wp-content/uploads/2023/09/Consolidation-Briefing-Paper_Final_021819.pdf

[73] https://rcap.org/wp-content/uploads/2021/09/RCAP-Regionalization-Research-Report_March-2020_Pages-1.pdf

undertake a five-year capital improvement plan, own annual wastewater system maintenance, assume Montrose's $300,000 United States Department of Agriculture (USDA)[74]

1.1.6 Capital Investment Recommendations: Alternatives to Conventional Infrastructure

The decisions that cities, towns, and utilities make about their investments in water infrastructure significantly impact the cost of water services and household affordability. There will be times when more expensive options will be the right ones to address particular health, safety, reliability, or other priorities. However, it may often be the case that a more robust portfolio of strategies – one that blends nature-based, digital and other non-traditional water infrastructure with built systems – can help to ensure that water services are more cost-effective over time. EFAB recommends the following eight actions to EPA for further consideration and potential development in this regard:

1. **Commission study on relative costs of alternative infrastructure investments**. Commission a comprehensive study documenting utility and regional data on the cost of green, distributed, nature-based, digital, and regional water infrastructure options implemented nationwide. This would be extremely valuable to communities and utilities seeking tangible information about how the cost of these strategies has played out in other areas.

2. **Identify standardized approach for assessing the life cycle benefits and costs of distributed and nature-based water infrastructure alternatives.** This effort should include approaches for assessing the benefits and costs of water use efficiency, source water protection, watershed restoration, GSI, and water reuse, to allow for an apples-to-apples comparison with more conventional approaches to capital investment in water infrastructure. This would involve compiling and refining the approaches that have been developed to date, not reinventing the wheel. While much work has been conducted on this topic, it can be hard to access and/or to adapt to specific utility circumstances.

3. **Elevate/highlight tools that have been developed for quantifying and valuing the co-benefits of nature-based infrastructure.** Elevate and highlight the tools that have been developed for quantifying and valuing the co-benefits associated with green infrastructure, energy efficiency (e.g., generating energy onsite), and other non-traditional water infrastructure, such as reduced urban heat island effect, creating more urban green space, economic and workforce development, and improved air quality, among others. While distinct from Recommendation 2, ideally these efforts would be closely integrated.

4. **Create a new comprehensive EPA affordability website**. Create a new affordability page on EPA's website that repurposes, updates, and integrates EPA's current set of resources related to each component to the affordability framework that EFAB has developed. The website should incorporate resources related to each section outlined in this report. With respect to capital investment alternatives to conventional infrastructure, the website would include resources

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[74] "Village of Montrose Joins EJ Water," Effingham Daily News, 18 Oct 2021. Accessed at https://www.effinghamdailynews.com/community/village-of-montrose-joins-ej-water/article_777d56aa-3046-11ec-aa0b-8b169bb9cb44.html

related to GSI, water efficiency and conservation, reuse, recycling, and digital solutions, among others, from utility cost savings and affordability perspectives.

5. **Expand EPA Integrated Planning Guidance and related policy to include drinking water regulations**. Revise EPA's integrated planning guidance to incorporate more of a "One Water" approach. Specifically, this would include incorporating compliance with drinking water regulations, in addition to wastewater and stormwater requirements, into EPA's Integrated Planning Process. Integrated planning identifies efficiencies, benefits, and affordability to best prioritize capital investments and achieve human health and water quality objectives. Integrated planning should balance compliance timelines with affordability, and the ability to assist low-income households, and prioritize projects (and mandates) that provide the greatest benefit to ratepayers.

6. **Develop metrics and affordability screening tool to help utilities integrate affordability into capital planning/investment decisions.** EPA has developed a similar tool in its FCA Guidance in the context of regulatory compliance; but this could be revised as an optional tool for utilities seeking to elevate local affordability issues in decision making. It could include, for example, measures of success that would allow utilities to examine forecasted spending against financial and affordability objects.

7. **Develop biennial publication highlighting case studies of non-traditional water infrastructure**. Develop a biennial publication highlighting case studies and lessons learned related to nature-based, digital, green and other forms of non-traditional water infrastructure for distribution to states and local governments. Ideally these case studies would be widely amplified not only through EPA's networks, but through the EFCs, academics, NGOs, CBOs and others capable of reaching a wide audience.

8. **Create PISCES and TAURUS awards for non-traditional water infrastructure**. Create distinct PISCES and TAURUS awards that recognize the most innovative non-traditional water and wastewater infrastructure projects funded by the DWSRF and CWSRF in each of five categories: conservation-based, distributed, nature-based, digital, and regional water infrastructure.

1.2 Capital Projects: Alternative Delivery Models

Figure 1-4. Project Delivery Systems (PDS)

There are many recognized PDSs:

- Project Delivery Systems where Owner Assumes Most of the Risk
  - Design-Bid-Build (DBB)
- Project Delivery Systems Where Owner and Builder Share Risk to Varying Degrees
  - Design-Bid-Build with Construction Management (DBB with CM)
  - Public Agency Management
  - Agency Construction Manager
  - Contract Construction Manager (Construction Manager at Risk)
  - Project Alliancing
- Project Delivery System Where Builder Assumes Most of the Risk
  - Design-Build (DB)
- Turnkey Variations
  - Lease-Develop-Operate
  - Extended Design-Build Arrangements
    - Design-Build-Operate-Maintain (DBOM)
    - Build-Operate-Transfer (BOT)
    - Early Builder Involvement (EBI)
- State-of-the-Art
  - Challenge-based procurement
- Bidding Systems
  - Lump Sum
  - Cost-Plus-Time Bidding (A+B)
  - Multiparameter Bidding (A+B+C)
  - Alternate Design
  - Alternate Bid
  - Deduct/Additive Alternative
  - Best Value Procurement
  - Reverse Auction Bidding
  - Bid Averaging
- Indefinite Delivery-Indefinite Quantity (IDIQ)

Another key aspect of water affordability involving capital investments involves how infrastructure decisions are implemented; that is, how the utility designs, bids, and builds their water projects. How these decisions are made has implications for household affordability. For many utilities, the project development process can be made substantially more affordable by adopting a holistic approach that emphasizes all phases of project planning, design, and construction, weighing each step in a way that reflects its overall importance to the system being developed, and the part it plays in serving society as a whole. However, the same caveats regarding the distinction between household affordability and utility cost savings outlined above applies here as well (see Section 1).

1.2.1 Challenges with conventional project delivery models

Conventional project delivery models frequently suffer from several challenges that affect the total amount a community will need to pay for infrastructure. First, projects can be over-designed or overbuilt relative to the needs of the community, adding to the total expense of the project. This is the suitability challenge. Second, some project delivery models often lock in designs that appear to have lower up-front costs but end up costing the community more over time due to high O&M costs. Third, some project delivery models misalign incentives, such that total project cost increases over time. For example, if lowest-bid processes are used, some builders may understate the true cost of the project to win the bid, then add cost via change orders after the project is awarded. All of these drivers increase the total expense associated with infrastructure projects, burdening ratepayers with higher than optimal costs, as discussed in more detail below.

- **Overbuilding.** There are incentives for water projects to be overbuilt. Designers and builders want to bring the best designs they can to their clients and also face financial incentives that increase fees as projects increase in size. Communities do not always have consensus on, or even a well-developed model for estimating their future requirements and therefore build in substantial margins of safety to account for this uncertainty. Therefore, there is a natural drift toward infrastructure projects that are larger, more complex and costlier than they need to be to meet a community's true requirements.
- **Lifecycle cost.** For water infrastructure projects, ongoing operations and maintenance costs across the life of a project represent a significant part of the total project expense. Moreover, there is frequently a trade-off between the up-front expense of project components and lifecycle cost. Higher quality components last longer, often use less energy, and require less maintenance than inferior capital goods. For pumps, for example, the initial cost of the pump represents just 10 percent of the lifecycle cost of the product, with the vast majority of the lifecycle cost coming from energy, maintenance, and other operational costs.[75] Purchasing on the basis of lowest cost can mean that lower-quality products are purchased, reducing the up-front capital cost but locking in years or decades of higher operational costs. Moreover, failing to budget for regular and preventative maintenance in the planning of a project will mean that the full lifespan will not be reached, and that greater expense will be required for reactive or emergency maintenance. As reactive maintenance is generally more expensive than preventative maintenance, this too adds to the affordability challenge.
- **Misaligned incentives.** A design-bid-build process that leverages lowest-bid contracting processes has been a standard in the water sector, particularly for public utilities. While intended to ensure the best utilization of the public dollars invested, as implemented it does not always, or even often, achieve this objective. As currently devised, a low bid is tied to extensive and detailed construction documents,[76] with the outcome intended to identify the lowest cost for a project that meets minimum specifications. While designers usually develop pre-bid estimates, they are often designed without realistic input from builders and may not be accurate. The competitive nature of the bid process is intended to provide integrity but can suffer from misaligned incentives; i.e., bidders may understate the cost of being selected. This often leads to requests for cost change orders once a contract has been signed. And since low bids encourage requests for cost change orders, they often lead to low confidence in the final projected total cost of projects.

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[75] https://www.xylem.com/siteassets/support/tekniska-rapporter/white-papers-pdf/life-cycle-costs-lcc-for-wastewater-pumping-systems.pdf

[76] *Utilizing Risk Management Techniques for the Control of Construction Contract Costs*, with K. Rajendra and J.J. Campfield. JOURNAL OF MANAGEMENT IN ENGINEERING, American Society of Civil Engineers, Volume 3, Number 4, New York, October 1987, Page 314-324.

Other project delivery models have been developed, including various General Contractor and Design-Build schemes, partially in response to this low confidence level. Recent research suggests that design-build projects are cheaper and experience less cost growth than design-bid-build and construction manager at-risk projects and are delivered substantially faster.[77] However, while such models attempt to address the idea of low bids, embedded in each are still components where contractors solicit low bids from subcontractors. In addition, because low-bid processes result in projects that meet only minimum specifications, they often under-perform from a financial sustainability perspective.[78]

1.2.2 Opportunities to address these challenges

- **An integrated approach.** Effectively addressing these challenges requires communities to take an integrated approach to project delivery planning that encompasses seven key steps: (1) visioning, (2) planning, (3) budgeting and funding, (4) design, (5) construction, (6) operations, and (7) maintenance. An integrated approach is key because "silos" between traditionally separate functional areas limit a community's ability to develop a clear view of its needs, to understand the economics of alternative solutions, and to build partnerships for efficient delivery. To put themselves in the best position to control the costs of water infrastructure projects, communities can leverage a project delivery strategy that integrates all functions of project developing into an open, matrix-type structure.
- **Leadership development.** If communities want to leverage alternative project delivery models to drive lower costs and greater predictability, they will need to build new capabilities. For example, managing a design-build project requires different skills than a design-bid-build contract. Public water system leaders also need to build a more collaborative culture of engagement to unlock the value of alternative project delivery. Too often, the relationships between stakeholders in projects are founded on the idea that people must "game" or "play each other" to either minimize the amount of money paid to contractors (from the owner's point of view) or to maximize the amount of money paid to contractors (from the contractor's point of view). Project delivery methods such as the traditional design-bid-build engender adversarial and confrontational relationships at every level. Such adversarial relationships usually harm the entire project structure, degrade the project's quality, and ultimately affect the cost of water. Thus, a pre-requisite of any organization contemplating or involved in the development, operation, or maintenance of a water system is that it must be organized and managed so that the people involved at all levels are treated and act in a respectful manner.
- **Statutory constraints.** State and local statutes often limit the forms of project delivery available to CWSs.[79] These restrictions limit communities' ability to select the project delivery models that are most likely to yield the most predictable, affordable, and well-designed options for

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[77] "Project Delivery Performance, 1998-2018." Design Build Institute of America.

[78] Engineering for Sustainable Communities: Principals and Practice, Lead Author, Chapters 6 and 10, Contributing Author, Chapter 19, American Society of Civil Engineers, Reston, VA, 2017.

[79] Project Delivery Systems – An Introduction for the Public Works Professional (2nd Edition), Dennis A. Randolph, P.E., PWLF, American Public Works Association, Kansas City, MO, www.apwa.net, October 2022.

them. Expanding the range of choices facing communities gives them more opportunities to advance affordable infrastructure project development.

Case Study in Right-Sizing: Denver Water

When Denver Water determined that it required additional potable water treatment capacity, it considered constructing a new 150 million gallon per day (MGD) facility. However, to reduce the cost of construction, the utility convened a cross-departmental group of employees from Water Resource Strategy, Engineering, Emergency Management, Operations and Maintenance, and Finance for a week-long evaluation event utilizing a decision-making methodology called Choosing by Advantage (CBA). CBA is a decision-making method that helps team members make sound decisions in a group setting to ensure that the decision made yields the most value and leads to the best outcome for the stakeholders. The CBA method acknowledges that all decisions are ultimately subjective, but it is designed to help team members use objective measures to inform those choices. CBA is utilized when there are multiple variables that need to be considered to reach a sound decision. There may be many plausible decisions that could be made, and CBA helps the team sort through them.

The outcome of Denver Water's CBA process was a consensus recommendation to move from constructing the 150 MGD facility to a smaller, state of the art 75 MGD capacity treatment plant that could be expanded as needed in the future, along with other treatment system improvements. This approach allowed the utility to reduce the capacity of its aging Moffat Water Treatment Plant, extending the useful life of this facility for two more decades while also providing Denver Water with additional operational flexibility.

From an affordability perspective, this approach will save the utility between $60 and $80 million in capital costs compared to what it would have cost to replace the Moffat facility, as well as providing the ability to expand when needed in the future. In addition to savings from constructing a smaller expandable treatment plant, operational efficiencies and other plant improvements will reduce annual operating costs by $1.7 million compared to Denver Water's other treatment plants. The Northwater Treatment Plant came online as Denver's fourth potable water treatment plant in 2024.

1.2.3 Capital Investment Recommendations: Alternative Delivery Models

The methods utilities use to design, bid out, and build local water infrastructure can significantly affect household water affordability. Some methods, such as design-bid-build, almost naturally lead to cost overruns. Such overruns can materially affect financial plans, resulting in unexpected increases in rates. For methods such as design-build, there can also be unforeseen changes in costs resulting from the conflict between owners and design-build team members if owners' representatives are not thoroughly familiar with the significantly different owner-contractor relationship model, again, can lead to cost overruns and time delays. CWSs can benefit from alternative project delivery structures, but only if they have the freedom to choose, utilize integrated planning processes, and equip themselves with the capabilities to succeed.

EFAB recommends the following four actions for further consideration and potential development (note these are numbered sequentially with the recommendations presented in the previous section):

9. **Study impact of alternative project delivery models on lifecycle costs of water infrastructure.** Commission a study on the impact of various project delivery strategies on the lifecycle costs of water infrastructure projects.

10. **Evaluate legal barriers to alternative project delivery models.** Commission a study of current state and local ordinances that allow or prohibit various water project delivery strategies, with lessons learned and tools (e.g., model ordinances) for overcoming identified barriers.

11. **Highlight long-term capabilities needed to effectively implement and maintain water infrastructure projects.** Develop high-level suggestions and ideas for how utilities can best organize to have the long-term capabilities needed to carry out the planning, designing, building, operating, and maintaining of water system capital improvement projects. These capabilities should ideally include incorporating quality-based selection processes.

12. **Initiate series of workforce development studies.** Initiate a series of studies to improve workforce development in the water sector. While STEM skills are important, the water sector also requires strong leadership and management skills that are not often integrated into STEM programs. Studies that EPA could implement that would ideally serve as a foundation for improved local capital improvement programs should focus on the following questions:

    - How can organizations be staffed and organized to implement capital improvement programs and individual projects successfully?
    - What technical and leadership training programs would be needed to provide the necessary staff qualifications to carry out future capital improvement projects optimally and successfully?
    - What Project Delivery Methods are most appropriate for a given type of program/project? And what are the most functional public/private partnerships from a household affordability perspective?
    - How can risk analysis focus more on meaningful project outcomes such as health improvements, reduced mortality rates?
    - What factors should be considered when establishing the type of project delivery method to be used for a project?
    - What changes to local and/or state rules and statutes could make more transparent and improve the options available to cities, towns, and utilities around the choice of project delivery methods best tailored and suited for any particular community?
    - What is the optimal target service life of facilities that would allow maximum funding to providing systems to communities without any facilities?

Section 2 – Operational Efficiencies

2.1 Background

Operating costs provide another opportunity to explore lowering the cost of providing water services and improving household affordability, as a number of commentors have noted.[80] Utilities have considerable flexibility in organizing how they operate, and numerous resources have been developed to support utilities seeking to maximize such operational efficiencies and limit ratepayer burdens where possible. This is a potentially vast subject and is outside of the direct scope of the current EFAB charge. However, given the strong relationship between the cost of water operations and household water bills, it is important to flag for purposes of the water affordability road map.

EPA has recognized for some time that effective utility management (EUM) practices are foundational for sustaining financial capacity and ensuring that water services are affordable. EPA's FCA Guidance is intended to, among other purposes, help communities identify pathways to reduce costs of CWA compliance.[81] An explicit element of this strategy is "effective utility management," embodying the concept that management practices should address all aspects of a system's operations and maintenance.[82] To this end, EPA has developed a comprehensive EUM Initiative that takes a broad look at all aspects of water sector system sustainability from product quality to customer satisfaction. There are case studies, webinars, and frameworks developed under EUM that can help inform communities on overall utility and financial management. These resources include but are not limited to the following:

- 10 Attributes of Effectively Managed Water Sector Utilities[83]
- Effective Utility Management: A Primer for Water and Wastewater Utilities[84]
- Moving Toward Sustainability: Sustainable and Effective Practices for Creating Your Water Utility Roadmap[85]
- Effective Utility Management in Action: Utility Case Examples[86]
- Taking the Next Step: Findings of the Effective Utility Management Review Steering Group[87]

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[80] See, e.g., See Teodoro, MP, Water and Sewer Affordability in the United States: A 2019 Update. AWWA Water Sci. (2020).

[81] EPA Clean Water Act Financial Capability Assessment Guidance (Feb. 2023) at 2.

[82] EPA Clean Water Act Financial Capability Assessment Guidance (Feb. 2023) at C-12.

[83] https://www.watereum.org/resources/interactive-primer/ten-attributes/

[84] https://www.epa.gov/sites/default/files/2017-01/documents/eum_primer_final_508-january2017.pdf

[85] https://www.epa.gov/sites/default/files/2018-11/documents/eum_practices_roadmap_final_508-10-2018.pdf

[86] https://www.epa.gov/sites/default/files/2018-11/documents/eum_case_examples_final_508-10-2018.pdf

[87] https://www.epa.gov/sites/default/files/2016-03/documents/eum_review_final_report_508.pdf

- Resource Guide to Effective Utility Management and LEAN[88]

2.2 Asset Management

Asset management is the practice of managing water infrastructure capital assets in conjunction with ongoing O&M to minimize the total cost of owning and operating those assets over time. In practical terms, once a utility has determined that it needs a project – be it a treatment plant, a pipe, green infrastructure, or other – the next issue from a fiscal health and ratepayer affordability perspective is: How can that project be implemented in the most cost-efficient way possible over time? (See Design Build sidebar).

Asset management is in essence a best practice approach to ensure that utilities are making the most prudent decisions around their water infrastructure and related assets by optimizing the balance between service levels, risk, and cost. Knowing when it is best to replace, versus repair or rehabilitate assets goes to the heart of a utility's finances and could, in many cases, have important implications for ratepayers and household affordability. It involves a combination of life cycle repair, replacement, and assessment of risk with a focus on maintaining the water services required. At times, replacing an asset early, before it breaks down, will be the best course to lower risk of disruption (e.g., you don't want to wait to replace an old well until it actually runs dry). At other times, the better course may be to actually run an asset all the way to failure.

The Southwest Environmental Finance Center, one of EPA's 10 EFCs, has done some of the most detailed and groundbreaking work about water infrastructure asset management. Among their many resources for utilities, they've created a free Asset Management Switchboard that outlines asset management basics and how utilities can get started, as well as deep dives on various topics and key benefits of having strong asset management programs. EPA has also developed substantial resources to support utility asset management; and there is a wealth of resources on the topic prepared by the EFCs, academics, water trade associations, and others.

While it is often assumed that these efficiencies will result in long-term savings, we have found few resources documenting the financial benefits of asset management in real terms.

2.3 Operational Efficiency/Asset Management Recommendations

EPA has developed considerable resources for utilities to support their ability to run their operations cost-efficiently and to put strong asset management programs in place. In particular, having more and more concrete data documenting the fiscal benefits of asset management could make a significant difference to utilities contemplating taking on the task of implementing asset management programs, which can be quite time and resource intensive. EFAB recommends the following actions for further consideration and potential development (note these are numbered sequentially with the recommendations presented in the previous section):

[88] https://www.epa.gov/sites/default/files/2016-01/documents/eum-and-lean-resource-guide.pdf

13. **Develop case studies to highlight successful asset management programs.** Commission a review of 12 to 24 successful water utility asset management programs that have resulted in significant cost savings. Key topics to address include:

    - What are the 3-7 most significant mistakes that water utilities make in managing their water infrastructure assets that result in adverse financial impacts?
    - How did the utility identify where to start, or identify the area or infrastructure type with the lowest cost of implementation and the greatest benefit?
    - Did the asset management approach result in substantial cost savings to the utility over time or provide additional avoided cost benefits? If so, how was that documented?
    - If asset management was proven to save utility resources, did that translate into rate benefits for households and if so can that benefit be quantified?
    - What distinguishes successful asset management – defined as saving utilities and their consumers substantial costs – from programs that are less successful?
    - Distinguish in the study between asset management programs for large complex utilities and smaller ones. While larger utilities often have more resources to put these systems in place, their greater complexity can make asset management more expensive and daunting than for mid-size and smaller systems. Alternatively, systems serving 10,000 people or fewer are often too resource constrained to implement even basic asset management systems. realistically only available to larger utilities with substantial resources, or can these programs be scaled to utilities serving smaller and mid-size populations (e.g., down to 10,000 people)?

14. **Develop federal incentives for utility asset management programs.** Develop incentives for local water utilities to implement asset management programs focused on maintaining utility fiscal health. Options could include but not be limited to:

    - Justice40 credit
    - Eligibility for higher levels of additional subsidy
    - Preference in WIFA loan funding

Consistent Recommendation 4 above, create a new affordability page on EPA's website that repurposes, updates, and integrates EPA's current set of resources related to each component of the affordability framework that EFAB has developed. With respect to operational efficiencies, the website would bring together its asset management and EUM resources as potential affordability strategies. Ideally this would include updating these resources to include case studies of how utilities are utilizing Continuous and Process Improvement tools to make substantial savings to operating processes (e.g., chemical dosing, supply chain management, lead service line replacement). Because this recommendation reflects a broader effort described above, (see Recommendation 4, Section 1), we did not assign it a unique recommendation number.

Section 3 – Federal Financial Support (SRF Additional Subsidy)

Federal spending on local water infrastructure represents a tiny fraction of total spending across federal, state, and local governments.[89] Nevertheless, there are various buckets of financial support available from the U.S. government, including through SRF programs, in the form of grants, below-market-rate loans, principal forgiveness, other "additional subsidies," and more, to help communities defray the cost of local water infrastructure and, in some cases, specifically support household water affordability. EPA has a key role to play in ensuring that communities can easily identify and access federal grant and loan opportunities most appropriate and relevant for their communities and to maximize the support available. As affordability concerns associated with the cost of water infrastructure have increased in recent years, federal efforts to provide additional forms of assistance to low-income households have grown. In this regard, EPA has requested that EFAB:

> *Research the possible* flow of SRF funds, through rate structures or other mechanisms, for *additional subsidization to ratepayers that would experience financial hardship because of an increase in rates necessary to fund capital infrastructure projects.*

Specifically, the charge is for EFAB to explore how state CWSRF programs may be able to provide more direct financial support to low-income households in communities that borrow money from the SRF via the CWA's additional subsidization provisions to provide direct support to households facing affordability challenges, *regardless of whether their community meets state affordability criteria*.[90] Accordingly, this section provides a brief overview of the structure of the SRFs, the role of the "additional subsidization" provisions, and how, for purposes of the CWSRFs, this role may be enhanced to provide more direct benefits to households facing affordability challenges.

3.1 Background on State Revolving Funds

EPA administers two SRFs that together represent the largest amount of federal support for local water infrastructure investments.[91] The CWSRF was established in amendments to the CWA in 1987,[92] and the

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[89] See, e.g., Congressional Research Service, Drinking Water State Revolving Fund: Overview, Issues, and Legislation (2018) at 11, citing Congressional Budget Office, Public Spending on Transportation and Water (federal share of total public spending on water and wastewater utilities was 4%, while state and local government expenditures accounted for 94% of all public spending on this infrastructure). While SRF loans are a helpful form of financing, these loans are repaid out of local rates and fees.

[90] 33 U.S. Code § 1383(j) - Additional Subsidization (1) "In any case in which a State provides assistance to an eligible recipient under subsection (d), the State may provide additional subsidization" – (A) in assistance to a municipality that – either (i) meets the affordability criteria established by the state; or "(ii) **does not meet the affordability criteria** of the State… (emphasis added).

[91] Some funding is available for project planning, but ongoing operations and maintenance costs are not.

[92] https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title33-section1383&num=0&edition=prelim

DWSRF by amendments to the SDWA in 1996.[93] The purpose of the SRFs was to replace a federal construction grant program for water and wastewater infrastructure for a self-sustaining loan program. The shift was aimed to improve efficiency and allow states more flexibility in addressing local water quality needs. The SRF programs were designed to provide below-market rate loans to fund water infrastructure that supports local utility compliance with CWA and SDWA mandates. Thus, DWSRF projects include primarily drinking water treatment, storage, and transmission facilities;[94] CWSRF projects focus primarily on wastewater collection and treatment systems, stormwater management, nonpoint source pollution control, water reuse, and estuary management projects. Through the Green Project Reserve, the CWSRFs target green infrastructure, water efficiency improvements, and other environmentally innovative activities.

The mission of both SRF programs is to reduce the cost of critical water infrastructure for local communities, but to do so primarily through Federal/state partnerships. The two SRF programs operate similarly in many ways, although there are key differences. Each year, Congress appropriates funding to EPA to be distributed to the state DWSRF and CWSRF programs. EPA allocates a percentage of funding ("capitalization grant") to each state based on its most recent needs assessments for the DWSRF program.[95] The capitalization grant allocations for the CWSRFs, by contrast, are based on a formula set by Congress.[96] The programs are sustained in part through repayment of the loans, thus creating a perpetual source of financing for drinking water and wastewater infrastructure. All principal and interest payments on loans must be credited directly to the SRFs, and loans are to be repaid within 30 years of a project's completion, not to exceed the project's useful life. One of the key benefits of the revolving loan model is that it allows the state programs to leverage funds to grow the overall pot of money available for borrowing.

The SRF programs provide an array of financing options to help lessen the cost of utility investments in water infrastructure. These include:[97]

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[93] 42 U.S.C. §300j-12. The DWSRF program is patterned after the CWSRF program that Congress authorized in 1987 for financing municipal wastewater treatment projects. See, Congressional Research Service, Drinking Water State Revolving Fund: Overview, Issues, and Legislation (2018) at 1. The CWSRF program replaced a construction grants program. See CRS Report 96-647, Water Infrastructure Financing: History of EPA Appropriations, by Jonathan L. Ramseur and Mary Tiemann.

[94] Dams and reservoirs are generally ineligible.

[95] The DWINSA is a statistical survey sent by EPA to public water systems throughout the country and estimates the infrastructure needs that are eligible for the DWSRF. The last one addressed projected needs from 2015=2024. The 2021 Bipartisan Infrastructure Law amended the CWA to direct EPA to conduct and complete an assessment of capital improvement needs for all projects that are eligible under Section 603(c) for assistance from state water pollution control revolving funds. https://uscode.house.gov/view.xhtml?req=granuleid:USC-prelim-title33-section1375&num=0&edition=prelim

[96] See CRS, Clean Water State Revolving Fund Allotment Formula: Background and Options (March 2023). As indicated in this report, how the Clean Water SRF formula works or may not work well is a subject of ongoing debate.

[97] https://www.epa.gov/cwsrf/about-clean-water-state-revolving-fund-cwsrf

- Below Market Rate Loans: Interest rates must be at or below market rate, including interest-free.
- Purchase of Debt or Refinance: SRF programs may refinance previously issued debt.
- Guarantees and insurance: Guarantees or insurance can be used where such assistance will result in improved credit market access or reduced interest rates.
- Guarantee SRF revenue debt: SRF programs may issue debt guaranteed by SRF funds. The revenue generated is used to provide assistance to borrowers for eligible projects.
- Provide loan guarantees: Revolving funds established by municipalities or inter-municipal agencies can receive loan guarantees.
- "Additional subsidization:" SRF programs can provide a portion of their capitalization grants as "additional subsidization" in the form of principal forgiveness, negative interest rate loans, or grants.
- Earn interest: SRF programs may invest in short-term investments; all interest earnings must remain in the Fund to be used for eligible SRF purposes.

While EPA provides guidance and program oversight, the SRFs are structured to operate at the state level. Thus, how the state programs are established, their funding priorities, eligibility, and scoring all have significant impacts for cities, towns, and local water utilities seeking financial support to lower the cost of local water investments.

3.2 Additional Subsidy Overview

The CWSRF program was established nine years prior to the DWSRF program. The success of the CWSRF in improving water quality with sustaining funding demonstrated by the effectiveness of the revolving fund model led to the creation of the DWSRF program. However, the DWSRF was established with the flexibility for states to provide additional subsidization that can come in the form of grants, negative loans, or principal forgiveness. The purpose of the subsidization was to allow states to ensure equitability for burdened communities and help them meet compliance requirements. [98]

Even though the DWSRF has had the ability to provide additional subsidization since it was established in 1996, not all states utilize this flexibility within the program. In 2009, Congress included additional subsidization provisions to CWSRF and made it a requirement that states provide a percentage of capitalization grant in a form of subsidization.[99] Most SRF programs seem to opt for principal forgiveness as the easiest option to administer.[100]

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[98] EPA: Drinking Water SRF DAC Definitions: A Reference for States at 5 (Oct 2022) at 16.

[99] In 2014, the Water Resources Reform and Development Act made additional significant changes to the program including expansion of eligibilities for CWSRF assistance and the use of additional loan subsides and among other elements to make the program more accessible. https://www.govinfo.gov/content/pkg/PLAW-113publ121/pdf/PLAW-113publ121.pdf.

[100] There are concerns that the recent trend toward Congressional earmarks for SRF programs, in some cases up to 60% of base program funding, is harmful to many communities and actually limits the amount of additional subsidy that could otherwise be available to support low income households.

The DWSRF funds are constrained to offer SRF subsidization funds to communities that meet their DAC definition while the CWSRF funds are not. This report does not analyze the states definition of DACs but would point out that EPA published a report called "DWSRF Disadvantaged Community Definition: A Reference for States" in June 2022. It details how states can maximize assistance to DACs by: (1) reviewing the indicators states are currently using to define DACs; (2) identifying how DAC criteria can better capture communities in need; (3) evaluating the relationship between DAC definitions and additional subsidy policies; and (4) exploring options for refining DAC assistance programs.[101]

Besides the benefits of utilizing SRF low interest loans for reducing cost of infrastructure upgrades, additional subsidies offer another benefit to local cost, which translates to utility bill relief. EPA requests guidance on opportunities to award SRF Funds that could be channeled to provide water bill relief for low-income households that might be struggling to pay their water bill. Specifically, to award additional subsidy funds (the below market interest rate being the first subsidization) to piggy-back with a loan award would defray all or part of the water bill increase that would be necessary to repay the SRF loan. This program could also accomplish providing a source of funds for utility bill relief in states where local ratepayer funds might be ineligible as a funding source for an assistance program. Additionally, it can serve to award funds to the metropolitan sewer agencies that often provide regional wholesale sewer treatment but don't have a billing relationship with households. The treatment costs often far exceed the local collection system costs, and the award of funds to the metropolitan sewer agencies could be distributed through channels that would reach the billing agency and eventual households impacted by treatment system investments.

The additional subsidy is identified as a tool that could be utilized to address the challenge that large utilities often have communities within that experience hardship. These communities on their own would qualify as a DAC but cannot access subsidy awards when blended into a larger utility criteria average. "Socioeconomic data for an entire town or service area may obscure the presence of a smaller population facing greater financial or other hardships."[102] The EPA is interested in the EFAB advising on the flow of funds through the SRF programs and the channels that would allow those funds to reach the target households, as both are challenges that have contributed to states not programming funds to this end despite previous EPA guidance and encouragement to do so.

3.3 Mechanisms to provide CWSRF Additional Subsidization benefits directly to low-income households

The CWA provides that additional subsidization is available not only when the statutory affordability criteria have been met but also when communities seeking SRF loans **do not** meet these criteria if:

- the additional subsidization is sought for the benefit of residential ratepayers;
- these ratepayers will experience significant hardship due to rate increases necessary to finance the project that is the subject of the SRF loan; and

[101] EPA: Drinking Water SRF DAC Definitions: A Reference for States (Oct 2022) at 1-2.

[102] (DWSRF Disadvantaged Community Definitions a Reference for States – EPA)

- the financial benefit of the additional subsidization is directed to those ratepayers.[103]

In most cases, CWSRF additional subsidization benefits appear to be provided when the state's affordability criteria for the municipality applying for the SRF loan has been met. However, there may be substantial under-utilized potential to support low income households in other communities as well. EFAB examined how EPA and state CWSRF programs may be able to better maximize benefits under § 1383 (i)(A)(ii), when the community affordability criteria are not met, but the additional subsidy is sought by the SRF loan applicant to support residents within their community who would be adversely impacted by rate increases related to the CWSRF loan. During the examination EFAB found barriers limiting the state's ability to implement this subsidy option.

One noteworthy barrier identified in talking to SRF program managers at the states is the federal allocation of funds to the SRFs. These programs have experienced significant decline in recent years as earmarks have been reintroduced and accessed at higher levels than before they were paused. Incremental Infrastructure Investment and Jobs Act (IIJA) funds have come with specific allocation requirements that limit flexibility to award according to prioritization criteria that have been developed at the state level (i.e. directed to lead service lines). Since this report focuses on action the EPA can take, that barrier will be set aside, though acknowledged.

Another perceived but not technically limiting barrier is the disadvantaged community definition determined at the state level. While the DWSRFs are constrained to offer SRF subsidization funds to communities that meet their DAC definition, the CWSRF funds are not. Regardless, the states utilize their DAC definition in awarding funds and would need to develop alternative qualifying and awarding criteria that would be based on qualifying subcommunities rather than full utility service area, and conditional upon successfully channeling awarded funds to utility bill assistance rather than across all ratepayers.

In meeting with state SRF program managers to understand what is already being done in revising DAC criteria, opportunities were identified for supplemental definition criteria that would open the door to program these funds. The requested scope and this report focus on the CWSRF that does not have the constraint to award subsidy through the DAC definition, though offering states alternative award criteria approaches is practical toward helping them administer and award such program funds.

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[103] 33 U.S. Code § 1383 - Water pollution control revolving loan funds provides specifically in Sub-section (i):

Additional Subsidization (1) "In any case in which a State provides assistance to an eligible recipient under subsection (d), the State may provide additional subsidization" – (A) in assistance to a municipality that – either (i) meets the affordability criteria established by the state; or "(ii) **does not meet the affordability criteria** of the State (I) if the recipient seeks additional subsidization to benefit individual ratepayers in the residential user rate class; (II) demonstrates to the State that such ratepayers will experience a significant hardship from the increase in rates necessary to finance the project or activity for which assistance is sought; and (III) ensures, as part of an assistance agreement between the state and the recipient that the additional subsidization provided under this paragraph is directed through a user charge rate system [ ]; (emphasis added). The same code section goes establishes that additional subsidization is also available "to implement a process, material, technique, or technology— to address water efficiency goals; to address energy efficiency goals; to mitigate stormwater runoff; or to encourage sustainable project planning, design, and construction." 33 U.S. Code § 1383 (i)(B)(i-iv).

Finally, a common theme of concern for SRF program managers is the administrative cost to develop a parallel award program. Examples include allocating limited subsidy funds to existing programmatic goals and also to the goals of additional subsidy targeted assistance, separate DAC criteria to develop and assess, additional application processes, and reporting requirements to ensure the complexity of a new and unique program is tracked and reported to reasonably achieve the goals of the program and have controls in place to minimize fraud, waste, and abuse.

3.4 SRF Additional Subsidy Recommendations

In order to address the obstacles identified above, EFAB makes the following recommendations:

15. **Create a pilot program to implement the CWSRF Additional Subsidy for low-income households.** Identify water utilities that are interested in partnering with their state CWSRF program to pilot a project that could be awarded loan funds with additional subsidy to channel to low-income utility ratepayers within the service area.

16. **Develop guidance toolkit to help SRFs implement the CWSRF Additional Subsidy for low-income households.** Develop a guidance toolkit advising SRF program managers of the opportunity to program CWSRF funds to low-income customers, including ways to award, set up the funding, work with a utility, and push the administrative burden of the program to the benefiting utility. Eventually the guidance toolkit should be revised to incorporate lessons learned from program pilots. Key focus areas of the toolkit would include:

    - Award criteria.
    - Application – require utilities to collect data to identify the number of eligible households that could receive channeled assistance funds and the calculation of assistance per households that would defray the related debt service cost to these households.
    - Guidance on ways to channel funds to target low-income households such as an existing utility low-income assistance program, local community action agencies that distributed COVID-19 LIHWAP funds, and considerations for hard-to-reach populations such as multiunit renters that pay utilities through a landlord who owns the master metered building account (see also CAP section of this report).
    - Ways to award the funds that will be distributed over the life of the loan – see example of Washington State Conservation Reserve Enhancement Program Trust Fund reserve – Washington develops/administers 15-year contracts with farmers who are compensated for planting native vegetation along salmon bearing streams instead of crops. Buffers are preserved under 10–15-year renewable contracts. Project costs are paid for by the program. This kind of analog could guide a sinking trust fund approach to reserving the assistance funds for the life of the loan to be awarded and drawn on through the life of the debt service to defray the low-income bill impact.

17. **Continue to explore approaches for defining DACs under DWSRF.** Build on EPA's existing effort to identify key elements that would reduce disparities among households resulting from state DAC definitions. This exercise would, of course, require considerable sensitivity to the fact the states have broad discretion in this regard and address widely different circumstances nationwide.

Consistent with Recommendation 4 above, create a new affordability page on EPA's website that repurposes, updates, and integrates EPA's current set of resources related to each component of the affordability framework that EFAB has developed. With respect to the SRF, the website would bring together in one place relevant (i.e., affordability-related) aspects of the agency's resources, policy, and guidance on both SRF programs, additional subsidy, and technical assistance. Because this recommendation reflects a broader effort described in previous Sections, we did not assign it a unique recommendation number.

Section 4 – Rate Structures and Design

Rate structures provide another opportunity for utilities to address affordability challenges. This section explores options to enhance water affordability through rate structures for states and communities that are not burdened by legal barriers. For states and communities where such barriers may exist, this section also describes potential pathways for overcoming and/or working within them. This section addresses the following aspects of EFAB's affordability-related charge:

> *To identify and analyze options for rate structure/design to help households who would be adversely affected by significant rate increases for water services, focusing on what can be accomplished within the bounds of existing legal requirements or restrictions (where those exist). Options might include, but would not be limited to, lifeline rates, income-based rate structures, senior assistance plans, host community rate structures, payment restructuring programs, and customer charge waivers. This analysis would be integrated with [the] element involving the legal limitations on consumer assistance programs.*

This section provides background on relevant aspects of rate-setting principles and requirements, as well as typical utility rate structures. It describes how rate setting principles and rate structures may be developed or modified to enhance customer affordability and provides recommendations to EPA for facilitating and supporting the adoption of best practices at the intersection of affordability and rate design.

4.1 Background on rate setting principles and requirements

4.1.1 Cost of service rate-setting principles

In general, utility water and wastewater rates are based on recovering the cost of providing service to customers. Depending on a utility's organizational structure and local or state requirements, rate schedules typically require approval by a utility's governing body (e.g., a city council or special district elected board or appointed commission) or by a state regulatory body (such as a state public utility commission).[104]

Cost of service ratemaking has a long history in the water sector – the first edition of *AWWA's Manual M1,* the drinking water sector's widely accepted manual of practice for establishing rates, fees, and charges, was published in 1954. The M1 provides guidance for establishing rates that recover the full cost of service associated with meeting a community's average use, peak demands, total water volume needs, and fire flow requirements. Within this framework, cost of service ratemaking includes three key steps:

- <u>Determine revenue requirements</u>: compare the revenues of the utility to its operating and capital costs to determine the adequacy of the existing rate to recover the utility's costs.
- <u>Allocate costs</u>: allocate the revenue requirements to the various customer classes of service in a fair and equitable manner. Classes are distinguished based on differences in demand

[104] See, e.g., Coglianese 2021

characteristics or other cost-influencing factors (e.g., customers receiving wholesale service through transmission lines rather than a distribution system network).

- Design rates: consider both the level and structure of the rate design to collect the distributed revenue requirements from each class of service.[105]

Although M1 has grown considerably in scope and complexity since its first edition, the basic functions that make up cost of service have not fundamentally changed.[106] This means that drinking water and wastewater service continues to be viewed as delivery of a commodity or service for which rates and charges are based on customers' demand characteristics.[107] As discussed in more detail below, this has resulted in adherence to methods for water pricing that limit the type of costs that can be recovered through utility rates, as well as how they are recovered (i.e., from which customers).

4.1.2 State guidelines for water and sewer utility rates

State statutes provide high level requirements related to local utility rate setting. These requirements vary by state and are often different for private and publicly owned utilities and sometimes, for water and wastewater utilities. The extent to which specific principles apply to a water or wastewater utility can also depend on the home rule nature of the state and/or municipality.

The most common limitation placed on water service rate setting is that rates must be "reasonable." Many states use additional terms, such as requiring rates to be "equitable," "nondiscriminatory," or "just." State statutes commonly stipulate that rates for customers within the same class must be "uniform;" while some include language that restricts utilities from granting "preference or advantage to any corporation or person." Anticipating how courts will interpret these state requirements can be challenging for utilities; often important aspects of rate setting become clear only after a utility rate schedule has been challenged by an impacted party, and the courts have weighed in.[108]

In most cases, rate-related statutes were established to prevent against monopolies by ensuring that utilities adhere to cost of service requirements, and to safeguard against one class of customers being charged for costs incurred by another class of customers (i.e., known as a cross subsidy). However, strict cost of service definitions and ambiguities in state statutes have led to real and perceived legal barriers to setting rates that address broader concerns, including household affordability. For example, providing different rates to low-income customers within a utility's residential class may be interpreted as "non-uniform" or "discriminatory." Some have interpreted the use of rate revenues to fund CAPs or income-indexed rates as an unfair cross-subsidy or as being "discriminatory" because they require one set of customers to pay extra to compensate for other customers paying less than their allocated share of cost of service. This topic is further addressed in Section 5, as it relates primarily to CAPs. Figure 4-1 provides

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[105] AWWA M1 7th edition

[106] Giardina and Teodoro 2018.

[107] Rothstein et al. 2019.

[108] UNC EFC et al. 2017

a few examples of how some state statutes and related court cases address cost of service and cross subsidies for publicly owned utilities.

Figure 4-1. Examples of how some state statutes and related court cases address cost of service and cross subsidies for publicly owned utilities

West Virginia: W. Va. Code § 24-2-4b(b), all rates set by government-owned water and wastewater utilities "shall be just, reasonable, applied without unjust discrimination between or preference for any customer or class of customer and based primarily on the costs of providing these services." The same statute provides that "[a]ll rates and charges shall be based upon the measured or reasonably estimated cost of service and the equitable sharing of those costs between customers based upon the cost of providing the service received by the customer. . . ."

Maine: Me. Stat. tit. 35-A, § 6105-4 lists seven purposes for which a governing body of a consumer-owned (i.e., public) utility may establish rates and prohibits the use of revenues for any other purpose.

Oregon: Or. Rev. Stat. § 264.310 states that water supply districts may fix and classify rates "according to the type of use and according to the amount of water used." *In Kliks v. Dalles City*, a case challenging differences in rates based on *non-service characteristics*, the court found, "all customers are entitled to receive the same service on an equal basis and at uniform rate." The court further held that "a difference in rates must find justification in a difference in conditions of service."

4.1.3 Common rate structures and typologies

Utility rate structures typically include a fixed charge and/or volumetric-based charges for water and wastewater services:

- <u>Fixed charges</u> are a set fee that customers pay regardless of the amount of water they use. Fixed charges help to ensure that utilities have a stable revenue stream to cover the fixed costs associated with providing water service. However, high fixed charges can disproportionately affect low-income households, who may use less water but pay a significant portion of their bill in fixed fees. In some cases, utilities establish a minimum charge that serves as a fixed charge but covers a set volume of water use.
- <u>Volumetric charges</u> are based on the volume of water a customer consumes, typically measured in gallons or cubic meters. The more water a customer uses, the higher their volumetric charge will be. Since this part of the bill varies with usage, it can incentivize customers to conserve water because reducing consumption directly lowers their costs.

Rate structures can incorporate fixed and volumetric-based charges in different ways. Table 4-1 provides a brief description of common rate structures and typologies, in large part based on EPA definitions (EPA 2024). Many of these structures or rate typologies can be implemented together. Note that some of these options are also only applicable to charging for water services, as sewer services are not metered and wastewater flows from customers have less variability, as they are tied to indoor use.

Table 4-1. Rate structures and typologies

Rate structure/type	Definition
Flat fee	All customers are charged the same fee regardless of the amount of water used. Simplest type of rate structure, rarely used.
Uniform volumetric rates	Constant per unit price for all metered units of water consumed. It differs from a flat fee in that it requires metered service. Can vary by customer class.
Increasing block rate	Volumetric pricing structure where the cost per unit of water increases as usage exceeds certain thresholds or "blocks."
Lifeline tiered rate structure	A form of increasing block rate structure where the first block typically includes a base level of usage (often considered enough to meet basic needs) and is charged at a lower rate. Subsequent blocks, representing higher levels of consumption, are charged at progressively higher rates.
Decreasing block rate	Pricing structure where the cost per unit of water decreases as usage exceeds certain thresholds or "blocks." The first block is charged at the highest rate, with subsequent blocks charged at progressively lower rates. It tends to encourage higher water use but makes water more affordable for large-volume users (although not always its primary purpose). It is often used in industrial or agricultural sectors where large quantities of water are required.
Seasonal water rates	Adjust cost of water based on seasonal demand fluctuations, typically increasing rates during periods of high demand (e.g., summer when water usage for irrigation, landscaping, and cooling systems is at its highest). Encourages consumers to use water more efficiently, reducing strain on the water supply during critical times.
Drought rates	Like seasonal rates but instead of applying higher rates for a set period, rates are adjusted based on the local area's drought level. Higher levels of drought result in higher prices to encourage conservation.
Average winter consumption (sewer only)	To more accurately capture sewer flows, some utilities charge for sewer services based on average monthly winter consumption because this more accurately captures indoor use in many climates.
Water budgets	Provide households with a "water budget" based on the number of people living in the house, property size, or other characteristics. Users are charged a certain rate for use within their budget and a higher rate for use that exceeds their budget.
Income-indexed rates	Charge income-qualifying customers a set percentage of their income for water and/or wastewater service. Helps to address circumstances in which low-income households do not (and/or cannot) have low water use. Have only been implemented by two water utilities in the U.S. (Philadelphia and Baltimore). Does not conform to cost of service standards in many states.

4.2 Rate-related strategies for enhancing affordability

4.2.1 Adopting "affordability-friendly" rate structure options that comply with traditional cost of service principles

Utilities have several options for enhancing affordability through rate design while following the traditional cost of service framework and abiding by statutes touching on rate setting in most states. For the purposes of this report, we refer to these options as **non-income qualified rates** because they are not tied to ratepayer income and can enhance affordability for all (or most) customers. Customers do not need to learn about, apply for, or document their eligibility to benefit, which is a challenge for income-qualified measures.[109]

First, it is widely recognized that increasing block rates can enhance affordability by providing a first block or tier that covers a basic level of water use at a lower price. This is not a complete solution in that it will not cover every scenario. For example, larger low-income households or low-income households living in older buildings with leaks that are costly to repair (or beyond their control because they are renters), may not be able to keep their water use to within the first tier. Nevertheless, in many cases these "lifeline" or increasing block rates can provide a critical level of water security to a majority of low-income households by offering lower costs to all customers for a level of basic use.

Establishing individualized lifeline rates based on a water budget can overcome some of the challenges associated with higher water use by low-income households. For example, some utilities, such as Denver Water, rely on average monthly water use in the winter (or a portion thereof) to establish a customized first tier for individual customers. In areas where little water use occurs outdoors in colder months, this can serve as a proxy for a baseline level of indoor use. This approach can have the unintended consequence of discouraging indoor water conservation but is also a more equitable way to offer lifeline rates. Other utilities have used property characteristics (e.g., irrigable area, frontage) to establish water budgets for a first tier.[110]

Class-based volumetric rates and seasonal rates, i.e., rates that increase water rates in summer months, while not specifically designed to address affordability, may have ancillary benefits by potentially shifting revenue responsibilities to seasonal customer populations.[111] Alternatively, high fixed charges have the opposite effect in terms of affordability. Fixed charges enhance revenue stability for utilities in low water use years (e.g., when drought restrictions are in place) and/or as per capita water use declines (e.g., as a result of conservation efforts). However, they minimize the extent to which low-income households can control or reduce their water bill, and when set as a minimum charge (associated with a specific level of use), can result in low water use households paying more for water than they might under alternative rate structures.

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[109] USWA

[110] Smith 2022

[111] Rothstein et al. 2019

Table 4-2 provides a summary of the advantages and limitations associated with non-income qualified rate measures from an affordability perspective.[112]

Table 4-2. Affordability-related advantages and disadvantages of non-income qualified rate structures

Rate structure description	Advantages	Limitations
Fixed charges/base charges	N/A	Limits a customer's ability to control their bill, particularly if set to recover a large amount of revenue.
Minimum charges	Provides a consistent cost or budget for households that stay within the minimum usage allowance.	Increases the "first unit price" and limits a customer's ability to control their bill.
Uniform volumetric charges/variable fixed charges	Can achieve higher revenue stability goals without compromising a customer's ability to control their bill.	Affordability benefits assume low-income customers consume less water, which is not universally true.
Increasing block rates/lifeline rates	Provides affordable access to the basic levels of service when tiered rates are appropriately set.	May not provide sufficient benefit for large households that exceed first block.
Decreasing block rates	Makes the water more affordable for large-volume users.	Encourages higher water usage.
Class-based rates	While not a direct affordability strategy, they ensure that residential customers are not paying higher rates to support non-residential customer classes when based on cost-of-service study.	Rates may be equitable to an entire class but may not address affordability for low-income members of a class.
Seasonal rates	While not a direct affordability strategy, they promote equitable charges so that year-round customers are not supporting part-time customers through higher rates.	Rates may be equitable to an entire class but may not address affordability for low-income members of a class.

Source: Raftelis Financial Consultants

[112] Most of this table was directly sourced from a presentation given by Crea and Fox (Raftelis Financial Consultants) at the 2023 Water Finance Conference.

Figure 4-2. Declining block rates are still prevalent in the water sector

The type of rate structures that utilities adopt vary considerably across the U.S. However, many utility rate structures are not advantageous from an affordability perspective. A 2016 survey of rates and rate structures for 2,786 water systems in seven states – Alabama, Arizona, Georgia, Illinois, North Carolina, and Wisconsin – found that, of those surveyed, 40% have uniform rates, 31% had increasing block rates, and 26% reported decreasing block rates. Large systems (population over 10,000) were much more likely to have increasing block structures, while small systems were much more likely to have a decreasing block structure. However, a few "very large systems" (population over 100,000) had decreasing block rates.

In a representative survey of U.S. water and sewer utilities conducted in both 2017 and 2019, Teodoro and Saywitz found that of the 325 water utilities that appeared in both the 2017 and 2019 samples, 60 had changed their rate structures. For water utilities, the most common rate structure change was from uniform or declining block to inclining block, with 23 utilities changing to more progressive rates. Nineteen changed to declining block, and 11 changed to uniform.

For any given community, determining the effectiveness of alternative rate designs to provide affordability benefits involves an understanding of the characteristics of low-income households, including average household use and consumption (e.g., by examining seasonal use in lower-income areas), average household size, and household type. As a simple example, lifeline rates applying to all customers can provide financial relief to households who stay within the first tier of an increasing block rate structure. Nationally, a high percentage of households (69 percent) living below 100 percent of the Federal Poverty Level (FPL) are one- or two-person households.[113] Lifeline rates in communities with a similar household size distribution for low-income customers can be an effective tool for enhancing affordability.

4.2.2 Thinking beyond the traditional cost of service framework

Several recent water industry efforts have focused on expanding the cost-of-service framework to better recognize water as a public good.[114] These efforts are based on the idea that customers receive significant benefits from water services that are not directly correlated to their use; for example, this has been the basis for incorporating the costs of fire protection into water cost of service studies. Expanding the definition of utility services to include public health and affordability would allow utilities to incorporate related costs into their revenue requirement determinations, including costs associated with CAPs and/or ensuring that all households have affordable access to water. This would be a critical first step to establishing the cost of service-based rates and fending off legal concerns.

As described in Section 4.1, cost allocation is the second step in cost-of-service ratemaking. Once relevant costs are established as part of the revenue requirements determination, Rothstein et al. advocate for a "common-to-all" cost allocation that distributes costs associated with affordability and

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[113] U.S. Census 2022 PUMS.

[114] See, e.g., Rothstein et al. 2019; Giardina and Teodoro 2019

public health across all customer classes.[115] Traditional examples of common-to-all costs are those incurred for source water protection, general utility administration, education, and communications. Costs are allocated this way because these programs and projects are fundamental to the delivery of water services, and all customers benefit from a utility's performance of these functions. Likewise, all customers benefit from the public health outcomes that accrue through universal access to safe water.

Several experts in the field have made a compelling case for expanding the conventional water utility cost of service methodology to explicitly include human health as a core utility function.[116] This would entail adding a fifth category to the four categories traditionally included in cost allocation methodology (i.e., average use, peak demands, total water volume needs, and fire flow requirements). Under this proposal, the new human health function would reflect the costs of building, operating, and maintaining a system that was designed only to provide for basic human health needs (which could be adapted to individual utility contexts). The share of supply, treatment, storage, transmission, and distribution facilities that would be necessary to provide those basic needs would be allocated to this new function.

Expanding the cost-of-service framework in these ways could result in significant benefits by providing a stronger legal basis for rate structures that improve affordability. For example, "human health functional costs could be used to help define volume allowances to be included with residential rates, appropriate charges for low-volume usage under volumetric structures, and/or lifeline rates. These considerations are likely to become more important in the future as AMI technology becomes ubiquitous and submetering in multifamily housing grows more common."[117] These approaches could provide a cost-of-service basis for rate-funded low-income CAPs and/or "public health" water rates. This would be particularly important in places where state laws restrict or prohibit ratepayer-funded assistance programs.

Another way to think about expanding the cost-of-service framework is to quantify the costs associated with unaffordable water bills. For example, the Natural Resources Defense Council (NRDC) recently developed a tool to help water utilities make the business case for affordability programs, with aim of supporting development of low-income discount programs and income-indexed rates by demonstrating the cost of unaffordable water bills. The premise of the tool is that a utility's ability to fund operations, maintenance, and improvements to their infrastructure is threatened when people cannot afford to pay their water bills. Unaffordable bills result in unreliable payments from customers; this in turn can increase costs associated with collections, shutoffs, and other aspects of financial management. A high rate of customer nonpayment due to unaffordable bills can even increase the utility's cost of borrowing, as credit rating agencies factor in utility collection rates when evaluating a utility's credit worthiness.[118]

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[115] Rothstein et al. 2019

[116] Giardina and Teodoro 2019

[117] Giardina and Teodoro 2019

[118] NRDC Study 2023

NRDC notes that this concept is reflected, to some degree, in the M1 and has been more widely accepted in the energy sector.

4.2.3 Considering income-indexed rates

Income-indexed rates can advance affordability by charging economically disadvantaged customers a set percentage of their income for water and/or wastewater service. They are often referred to as "income-based rates," and in the energy sector where they have a longer history, as percentage-of-income payment plans (PIPPs). Index programs set rates based on a predetermined percentage of income that is deemed affordable for a given community; in this way they are different from traditional CAPs that provide a flat discount or a percentage discount on all or part of a household's current water or wastewater bill. However, setting rates based on income is not necessarily consistent with current cost of service methodology. Philadelphia is the first water system to implement income-indexed rates through its Tiered Assistance Program (TAP, see text box).

According to a recent NRDC report, a key advantage of income-indexed rates is that they directly address affordability compared to traditional CAPs.[119] With traditional CAPs that provide a flat rate discount or a percentage-based discount, the size of CAP benefits are established without regard to how large the individual household's remaining bill will be or to whether the household can afford that amount. As a result, households participating in ongoing assistance programs still may end up with an unaffordable water bill depending on the amount of assistance offered, the size of the bill, and the household's monthly income.

Income-indexed rates, in theory, enhance affordability and public health goals by ensuring a basic level of water service for low-income households at a reasonable price based on their specific circumstances. However, the Philadelphia Water Department's (PWD's) income-indexed rate program, known as the TAP, has experienced practical implementation challenges. A 2023 review of the program reports relatively low participation rates, high attrition rates for current participants, and high administrative costs for the utility (estimated at 50 percent by the author).[120] The author further notes that the program's administrative costs are not recovered through the TAP surcharge but included in PWD's operating budget. As a result, TAP has increased bills for low-income households who do not participate in the program, including households in multi-family buildings, where lower income residents are more likely to live.

It is not clear, however, whether broader conclusions about the efficacy of income-indexed rates can be drawn from Philadelphia's experience. Many of the challenges PWD has experienced are similar to those experienced by utilities implementing CAPs that rely on income qualification/verification (see Section 5). They do not necessarily stem from the design of the income-based rate structure itself. For example, PWD recently significantly increased enrollment in TAP by auto-enrolling customers based on data from other state and federal assistance programs. Moreover, while participation rates in Philadelphia have reportedly hovered around 28 percent prior to the automatic enrollment effort, this

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[119] NRDC Study 2023

[120] Teodoro TAP Dance

is higher than participation rates for many utility CAPs (see Section 5). Additional research and models are needed before specific conclusions can be drawn related to the effectiveness of income-indexed rates in the water sector.

4.2.4 Creating a separate stormwater charge to enhance rate equity

This section has focused thus far on drinking water and wastewater rate structures. Stormwater management revenues are often established very differently. Funding for stormwater can be derived from property or sales taxes as dedicated charges and/or funneled through general funds. In some cases, and increasingly, communities have established stormwater utilities with authority to set fees and charges.[121] In communities with combined sewers, funds for stormwater management are often recovered through wastewater rates.

The amount of stormwater a property generates (and thus, the cost of providing stormwater management services to that property) is related to the amount of impervious surface area it has, such as buildings and other structures, parking lots, and driveways. Establishing an impervious area-based stormwater charge (if designed correctly) can therefore better allocate costs across a customer base relative to other approaches. This is because they are directly tied to how much stormwater runoff a property contributes to a city's stormwater management system, as opposed to a customer's water use or the value of their property.

From an affordability standpoint, single family homes and multifamily properties (on a per unit basis) often have less impervious area than larger commercial properties with large parking lots or storefronts. Establishing a stormwater fee based on impervious area can reallocate costs to customers who contribute most to stormwater management costs, alleviating rate/cost burdens on low-income households. There is a relatively large percentage of stormwater systems that do not collect fees or taxes via a stormwater utility. Western Kentucky University's (WKU's) 2023 survey identified 2,109 stormwater utilities in the U.S. – defined as a utility that has been established for the purposes of funding stormwater management through fees or charges. The WKU survey reports that in 2019, there were as many as 22,389 communities participating in the National Flood Insurance Program; close to 8,000 communities are subject to an MS4 permit and/or requirements for combined sewers.

The gold standard is to establish stormwater fees based on the measured impervious area of each property subject to the fee. However, in many cases, this can be difficult because of cost constraints. WKU's (2023) analysis of equitable stormwater rate structures concludes that the more tiers represented in stormwater rate structure, the more equitable the fee is (and, essentially fees based on measured impervious area or equivalent residential unit multiplier have infinite tiers). The survey authors note that because fees are often subject to legal challenges, a community wanting to set up a SWU should contract with a company that routinely performs this service.

4.3 Rate Structure Recommendations

Although considerable work has been done (and continues) on water affordability and rate-related issues, substantial data and information gaps remain. In addition to the policy recommendations below,

[121] WKU 2023

we have identified several areas where an EPA-sponsored study could provide invaluable information to advance household affordability at the utility level. Some of the recommendations below overlap with issues and recommendations addressed in the subsequent section on CAPs, including those related to legal barriers to funding CAPs with rate revenues.

18. **Develop policy statement that recognizes the benefits of expanding the cost-of-service framework to incorporate affordability/public health.** Issue a new EPA policy supporting expansion of the cost-of-service framework to include public health and affordability. Establishing such a policy would recognize that customers receive significant benefits when all residents in a community have access to clean and reliable water services. This effort would provide a stronger legal basis for funding CAPs or income-indexed rates through rate revenues by providing a nationally endorsed approach for cost-of-service ratemaking. It would be useful to work with national water sector organizations and other key stakeholders (including potentially EFAB) in developing this policy.

19. **Incorporate utility affordability actions/efforts into federal funding decisions.** Incorporate prioritization criteria related to how well utilities are addressing affordability (e.g., through rate design and/or CAPs) into federal water and wastewater infrastructure funding/financing program decisions. Specifically, EPA should develop criteria for state level SRF programs providing higher point values for utility applicants that are addressing local water affordability challenges proactively and effectively. There is precedent for this prioritization via EPA's updated FCA Guidance Financial Alternatives Analysis. These criteria could also apply to WIFIA loans and other federal water infrastructure funding sources.

20. **Provide examples of state statutes that allow funding for CAPs and/or incorporating public health/affordability into cost-of-service rate practices.** Provide examples of state statutes that can serve as models for rate guidance that allow for funding CAPs and/or income-based rates with rate revenues, and/or incorporating public health and affordability into cost-of-service rate practices.

21. **Provide enhanced technical assistance for utility rate development.** Provide enhanced technical assistance to utilities for rate development, particularly for mid-sized utilities and for stormwater fees. Many of the existing EFCs throughout the U.S. are well suited to provide this assistance, and some already do.

22. **Study the effect of alternative rate structures on affordability.** Commission studies to explore key rate-related affordability issues, including:

    - Advantages and disadvantages of income-indexed rates, focusing on the financial impacts to utilities and customers.
    - Impact of best practices for rate design on utilities and low-income customers.

Section 5 – Customer Assistance Programs

Even if all of the options identified above are optimized, there are households in every community that will be unable to pay for essential water services. While a growing number of utilities have adopted CAPs of various kinds, the reach of utility-led CAPs is limited. An EPA survey of 800 communities found that only 30 percent of utilities offered CAPs, and further, that this assistance does not always reach the households most in need. In addition, CAPs vary in structure and size and often address only short-term needs (e.g., by providing temporary assistance to households experiencing financial emergencies). Nationally, CAPs suffer from uneven outreach efforts, differences in the amount of assistance provided, and low participation rates. Because of real or perceived legal barriers, CAPs often require special funding sources (e.g., customer donations) and/or additional funding streams to create robust programs. This section explores options for enhancing direct assistance to water sector customers through CAPs and/or other programs addressing the following component of EFAB's affordability-related charge:

> *To identify and analyze common state and/or local legal barriers (and possibly other types), including perceived barriers, to adoption of CAPs and other affordability measures, and provide recommendations for EPA to address these. For example, few states explicitly preclude CAPs; instead, they establish broad restrictions on how ratepayer funds can be used, which can provide some room for flexibility. Having a more precise understanding of the 3-5 primary types of barriers will provide a foundation for EFAB's recommendations to address affordability challenges.*

The following sections describe key barriers to CAP implementation and participation, highlight several successful local CAP programs, and describe efforts related to the development of state and federal level water assistance programs. This information provides background and context for EFAB's recommendations related to how EPA can facilitate the provision of direct assistance to low-income customers.

A key point in examining the role of CAPs as a way of mitigating water affordability challenges is that utilities were not established to provide social assistance and, except for some notably excellent programs (see highlights below), often face challenges in implementing these programs. While the recent (but temporary) Low Income Household Water Assistance Program provided relief to more than 1.7 million households in the aftermath of financial challenges experienced during COVID-19, much of this assistance went directly to utilities to address debt for customers who were unable to pay their bills. Although helpful, LIHWAP did not establish the programmatic infrastructure necessary to provide customer relief on a sustainable basis. For these reasons, one of EFAB's core recommendations is centered around the development of a national water assistance program that leverages other federal assistance programs to provide direct assistance to utility customers.

5.1 Types of CAPs

In its 2016 *Compendium of Drinking Water and Wastewater Utility Customer Assistance Programs,* EPA defined several types of CAPs typically offered by water and wastewater utilities:

- **Bill Discount.** Utilities reduce a customer's bill, usually long-term. Can be applied to nearly any type of rate structure or aspect of the bill (e.g., variable rate structure, fixed service charge, and volumetric charge). Can be offered as a percentage or flat rate discount.
- **Flexible Terms.** Utilities help customers afford services and pay bills through arrearage forgiveness and/or management (e.g., rewarding timely bill payments by partially forgiving old debt and establishing a payment plan for future payments), bill timing adjustment (e.g., moving from quarterly to monthly billing cycles), or levelized billing (e.g., dividing total anticipated annual water and sewer bill by 12 to create a predictable monthly bill amount).
- **Temporary Assistance.** Utilities help customers on a short-term or one-time basis to prevent disconnection of service or restore service after disconnection for households facing an unexpected hardship (e.g., death, job loss, divorce, domestic violence). Also known as emergency assistance, crisis assistance, grant, one-time reduction.
- **Water Efficiency.** Utilities subsidize water efficiency or conservation measures by providing financial assistance for leak repairs and offering rebates for WaterSense-certified fixtures, toilets, and appliances.[122]
- **Lifeline Rates for low-income customers.** With this model, low-income customers pay a lower rate for a fixed amount of water, which is expected to cover that customer's basic water needs. When water use exceeds the initial fixed amount of water (i.e., the lifeline block), the rates increase. Lifeline rates are described in the previous section on rate structure options (Section 4) because they can be applied to all customers within a class (e.g., all residential customers), with the intent of enhancing affordability while abiding by any potential cost of service or non-discriminatory rate structure requirements.

5.2 Barriers to CAP Implementation

As demonstrated not only in EPA's compendium but also in considerable additional research, many water utilities nationwide offer customer assistance of various kinds to ratepayers who find themselves struggling financially. However, as has also been well documented, these programs are not always effective, and many utilities offer little or no customer assistance at all. There are several inter-related overarching reasons generally provided for these challenges: (1) perceived and/or actual legal barriers; (2) relatively low rates of participation; and (3) low levels of funding or other available resources to implement CAPs. In addition, many of the country's lowest income households (particularly in urban areas) are "hard-to-reach," meaning they do not pay their bill directly to a utility but through rent or similar fee. This means they do not benefit from conventional assistance programs.

5.2.1 Legal restrictions related to funding

As indicated in Section 4, ambiguous and/or restrictive statutory language has created real and perceived barriers in many states as to whether utilities are allowed to tap their primary revenue source

[122] Lifeline rates are described in the previous section on rate structure options (Section X) because they are often applied to all customers within a class (e.g., all residential customers), with the intent of enhancing affordability while abiding by any potential cost of service or non-discriminatory rate structure requirements. However, when offered to a specific set of customers (i.e., income-qualified customers) this would be considered a CAP, for the purposes of this paper.

– customer rate revenues – to fund CAPs. As a result, many utilities either forgo these programs entirely or rely on other sources of funding or revenues (such as customer donations, cell phone tower leases, rental income, etc.) to pay for these programs. As a result, CAPs are often relatively small-scale programs that do not fully address the needs of low-income customers.

While the specific legal issues vary by state and locality, in general the concern is that providing lower rates or discounts or other forms of financial assistance to low-income households might be deemed unlawful "cross-subsidization" of one set of customers by another, or unlawful "discrimination" against some customers in favor of others.[123] However, in many cases the state law is unclear or not definitive. A study led by the University of North Carolina (UNC) EFC found that while few states explicitly authorize utilities to fund CAPs with rate revenues, very few have enacted explicit prohibitions preventing utilities from doing so.[124] The study developed four categories to describe relevant legal frameworks in each state:[125]

- Explicitly authorized to fund CAPs with rate revenues.
- No express authority but nothing in the statutes or case law limits an entity from implementing a CAP.
- Potential for legal challenge, arising from ambiguous language, limiting terminology, or cost of service requirements.
- Specifically prohibited from funding CAPs with rate revenues.

As indicated on the maps below, the study found that utilities in most states are not subject to specific legal limitations regarding the use of ratepayer funds for CAPs, but are also not expressly authorized to do so (shaded in light green on the public utilities map), or in some cases, potentially face challenges but are not expressly prohibited (shaded in yellow on the public utilities map). Publicly owned utilities are expressly authorized to fund CAPs with ratepayer revenues in only two states/areas: Washington and DC. Utilities regulated by a public utility commission are explicitly authorized to do so in four states: California, Kansas, Nevada, and Washington. Alternatively, in Arkansas, California, and Mississippi, publicly owned utilities are specifically prohibited from funding CAPs with ratepayer revenues. In Arkansas, Colorado, and Maryland, commission-regulated utilities cannot use rate revenues to fund CAPs.

Subsequent figures present examples of relevant state statutes and court cases from three states, demonstrating the range of authority to implement CAPs funded with ratepayer revenues:

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[123] NRDC 2023, see also section 4.

[124] UNC EFC, published in 2017

[125] The study authors grouped each state (and Washington D.C. and Puerto Rico) into one of the four categories based on their understanding of whether relevant state statutes and case law allowed these utilities to fund CAPs with rate revenues. Each state was separately assigned a category for commission-regulated utilities (i.e., private or investor-owned) and non-commission-regulated utilities (typically publicly owned) because requirements for these utilities can be different within a particular state.

- Arkansas, where rate funded CAPs seem to be specifically prohibited for commission-regulated based on relevant case law, and where municipalities can *only* exercise such powers as are expressly granted to them (per the UNC EFC report) such that funding ratepayer CAPs is likely prohibited for non-commission-regulated utilities run by a municipality.
- Texas, where rate funded CAPs are not expressly authorized but non-commission regulated utilities, i.e., public utilities, can seemingly fund them. Investor-owned (commission-regulated) utilities may face potential challenges.
- Washington, where it is expressly authorized for both commission-regulated and non-commission regulated utilities.

Since the UNC EFC et al. report was published, at least a couple of states have made movement towards new legislation that explicitly authorizes ratepayer-funded affordability or assistance programs. NRDC's Water Affordability Toolkit contains two examples from Illinois and New Jersey[126] (1) Illinois enacted legislation providing water or sewer utilities with the option to collect a surcharge on customer bills, with the state using the funds to run a program on the utility's behalf; and (2) legislation pending in New Jersey (as of mid-2023) would specifically authorize publicly owned water, wastewater, and stormwater utilities to offer rate-funded low-income discounts.

As discussed in the previous section, incorporating public health into rate as an explicit function in the cost of service framework would provide a foundation for utilities to use rates to cover the cost of CAPs, better ensuring that all households have affordable access to water. This would recognize that all customers receive benefits from water services that are not directly correlated to their use. It could also support a rationale for allocating these costs across customer classes, based on the premise that all customers benefit from water utilities' support of public health, as it contributes to a more productive society and reduces social costs associated with public assistance.

From a cost-of-service ratemaking perspective, which has traditionally been tied to cost causation, it is important to also demonstrate the business case for CAPs based on the costs associated with unaffordable water bills. The UNC EFC et al. 2017 report notes that this could provide legal support for ratepayer-funded programs, stating: "Rather than framing a CAP as a subsidized rate class, present it as an essential cost of running a utility that provides financial benefits to all customers." NRDC recently developed a business case assessment tool for CAPs to help utilities estimate these costs, including costs associated with collecting unpaid debts, disconnecting customers who fall behind on their payments, and reconnecting them when they have caught up.

[126] NRDC 2023

Figure 5-1. Ability to Implement CAPs Funded by Ratepayer Revenues, by State

Figure 1. Commission-Regulated Utilities: Ability to Implement CAPs Funded by Ratepayer Revenues, by State

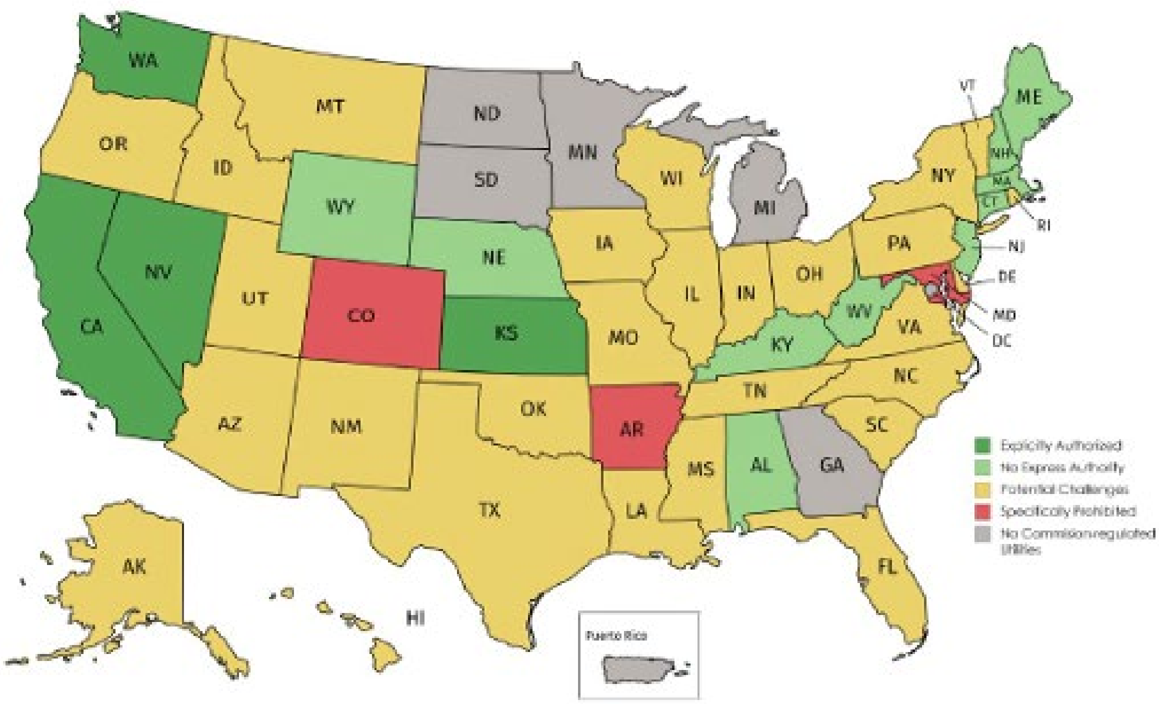

Figure 2. Noncommission-Regulated Utilities: Ability to Implement CAPs Funded by Ratepayer Revenues, by State

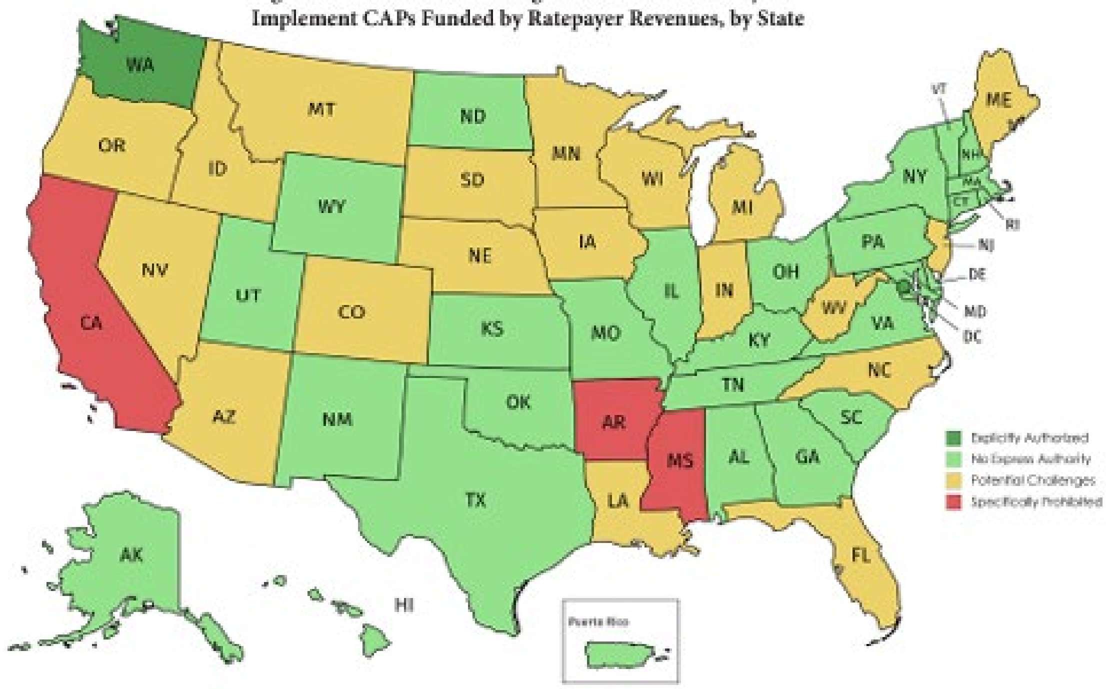

Figure 5-2, 5-3, and 5-4. Findings from UNC EFC et al. report on ability to implement CAPs funded by ratepayer revenues, commission-regulated and non-commission-regulated utilities

Arkansas

UNC EFC et al. 2017 Determination: **Specifically prohibited** for both commission-regulated and non-commission-regulated utilities.

Commission-regulated utilities

Relevant state statutes

Ark. Code Ann. § 23-3-114 no utility "shall make or grant any unreasonable preference or advantage to any corporation or person. . .." or "establish or maintain any unreasonable difference as to rates or services, either as between localities or as between classes of service."

Ark. Code Ann. § 23-4-101(b) - rates may not be "unjust, unreasonable, insufficient, unjustly discriminatory."

Relevant case law

Arkansas Gas Consumers, Inc. v. Arkansas Public Service Commission (APSC) – State Supreme Court considered legality of APSC's *Temporary Low Income Customer Gas Reconnection Policy,* which allowed income-eligible customers who had been disconnected from service to have their service restored if they paid their utility's reconnection fee in full and participated in a payment plan. The program was paid for through surcharge against all customers.

Court ruled "nowhere in the Utility Code is the PSC, on its own motion, given the legislative authority to pay off the bad debt of low-income customers by assessing all ratepayers; nor is authority granted to the PSC to continue that assessment on all ratepayers to fund a low-income assistance program."

Based on the outcome of the court case, commission-regulated seemingly cannot fund CAPs with ratepayer revenues.

Noncommission-regulated utilities

Relevant state statutes

Ark. Code Ann. § 14-235-223(a)(1) requires municipal-owned wastewater utility rates to be "*just and equitable"*

Ark. Code Ann. § 14-234- 214 allows municipal-owned water supply utilities to use surplus revenues in multiple ways, including for "any other municipal purpose."

Ark. Code Ann. § 14-199-101 limits the use of surplus revenues to a list of specific purposes, which, in terms of assistance, includes only assistance for low-income customers of municipal electric utilities.

In Arkansas, municipalities and counties can *only* exercise such powers as are expressly granted to them by the legislature and as are necessarily implied for effecting the purposes for which the grant of power was made.

Based on the narrow definition of "any other municipal purpose," noncommission-regulated utilities seemingly cannot fund CAPs with ratepayer revenues.

Texas

UNC EFC et al. 2017 Determination: **Potential challenges** for commission-regulated utilities and **no express authority (but no limiting language)** for noncommission-regulated utilities.

Commission-regulated utilities

Relevant state statutes

Tex. Water Code Ann. § 13.182 - rates must be "just and reasonable" and cannot be "unreasonably preferential, prejudicial, or discriminatory, but shall be sufficient, equitable, and consistent in application to each class of consumers."

Tex. Water Code Ann. § 13.189 prohibits commission-regulated utilities from granting "any unreasonable preference or advantage" to any person within any classification or from subjecting any person to any "unreasonable prejudice or disadvantage." May not utilize "unreasonable differences as to rates of service either as between localities or as between classes of service."

Tex. Water Code Ann. § 13.190, commission-regulated utilities may not receive greater or lesser compensation for services than what is prescribed in the schedule of rates.

Utilities seeking to implement CAPs funded by rate revenues must therefore get approval from Texas PUC to utilize rates that differ from those prescribed in the rate schedule.

Noncommission-regulated utilities

Relevant state statutes

Under Tex. Loc. Gov't Code Ann. § 552.001 municipalities are granted authority to own and operate water and wastewater utilities in a manner that protects the interests of the municipality.

Relevant case law

Gillam v. City of Fort Worth - Texas court held that "whether differences in rates between classes of customers of municipal water works are to be made, and, if so, the amount of the differences, are legislative rather than judicial questions and are for the determination of the governing bodies of the municipalities."

The Court cited previous Texas case law stating municipal water or other utilities "have the right to classify consumers under reasonable classification based upon such factors as the cost of service, the purpose for which the service or product is received, the quantity or amount received, the different character of the service furnished, the time of its use or *any other matter* which presents a substantial difference as a ground of distinction."

Based on the outcome of this court case and the previous Texas case law cited, it appears that noncommission regulated utilities can fund CAPs with rate revenues by categorizing income as a matter that presents a ground of distinction.

Washington

UNC EFC et al. 2017 Determination: **Explicitly authorized** for both commission-regulated and noncommission-regulated utilities.

Commission-regulated utilities

Relevant state statutes

Wash. Rev. Code § 80.28.068. Commission-regulated utilities can request approval from the Washington Utilities and Transportation Commission (WUTC) to provide reduced rates to "low-income senior customers and low-income customers." The same provision states: "expenses and lost revenues as a result of these discounts shall be included in the company's cost of service and recovered in rates to other customers."

Noncommission-regulated utilities

Relevant state statutes

Wash. Rev. Code § 74.38.070., § 35.92.020(5), § 35.67.020(5), § 36.94.140(4) grant government owned water and wastewater utilities explicit authority to implement low-income CAPs funded by rate revenues.

Wash. Rev. Code § 35.92.380, § 36.94.370 states that cities, towns, and counties can waive connection or tap fees for low-income customers, "pursuant to a program established by ordinance."

Wash. Rev. Code § 57.08.014 allows water and wastewater districts to adjust or delay rates for low-income customers if they publish such rates and offer the adjusted or delayed rates to all low-income customers in their service area. This statute also allows government-owned utilities to offer deferred payment plans to customers with temporary financial difficulties.

Based on these statutes, all water and wastewater utilities in Washington can fund CAPs with rate revenues.

A small number of communities have found creative ways to provide discounts or alternative rates to low-income customers within existing legal frameworks. Figure 5-5 provides an example from Camden, New Jersey, where the regional wastewater provider offered a "host community benefit" to residents of Camden, where the wastewater treatment plant is located. This benefit was provided to all residents within the city; however, Camden has a disproportionate number of low-income households compared to the rest of the wastewater service area. While this program provides a substantial benefit to many low-income households, and it is likely that many wastewater treatment plants are located in lower income areas, these types of solutions are limited and context dependent.

Figure 5-5. Camden, NJ: Using host community benefit to reach low-income customers

In New Jersey, state statute N.J. Rev. Stat. § 40:14A-8.2 specifically authorizes municipal and county water and wastewater authorities to establish reduced rates or total abatements for *senior and/or disabled citizens* meeting certain income requirements. The Camden County Municipal Utilities Authority (CCMUA) implemented a "host community benefit" in the form of a bill discount for residents of Camden, the city where the utility's primary wastewater treatment plant is located.

New Jersey state law allows county- and municipal-owned wastewater authorities with treatment plants that are located within a city's boundaries to negotiate a host community benefit for residents and qualified entities within the city. CCMUA worked with the City of Camden to provide a bill discount to city residents. Under this arrangement, CCMUA charged all Camden residents $220 per household per year for sewerage services (as of 2017), while charging the rest of Camden County $352 for the same services. Although the host community discount benefits all Camden residents (including affluent residents), Camden is one of the most economically challenged cities in the country. Therefore, providing the benefit in this manner comes very close to providing rate relief on an income basis, as it benefited a substantial number of low-income households.

CCMUA was able to provide the host community benefit based on the rationale that the regional wastewater system that it built to bring wastewater flows from its other 36 suburban municipalities to the treatment plant does not benefit Camden. Thus, CCMUA reasoned that Camden should not contribute to the full cost of operation and maintenance, or the full cost of debt service associated with it. Further, the utility reasoned that the plant's property could be used by a private company that would pay taxes. Thus, the host community benefit is in lieu of the tax rates that the city is missing out on because CCMUA, as a governmental entity, does not pay taxes.

5.2.2 Low participation

For those utilities that do offer water affordability or assistance programs, customer enrollment is often a significant challenge. According to one credible study and anecdotal experience, most utility-level water assistance programs reach only 10 percent to 15 percent of potentially eligible households.[127]

Low participation rates often stem from the high administrative burden on low-income customers often required for them to enroll in their local CAPs. Administrative burden, or "hassle factor," refers to the time and resources required of eligible households to apply for and maintain assistance. Low-income customers generally need to learn about the program, submit documents to prove eligibility, wait for approval, and periodically reapply. These processes can be time-consuming and resource intensive requiring multiple sources of income verification, in-person appointments, etc., resulting in low participation.[128]

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[127] Vedachalam and Dobkin 2021

[128] The U.S. Water Alliance reports that administrative issues and red tape are one of the biggest barriers to participation in federal assistance programs.

It is important to note that several utilities, such as DC Water, SAWS, and Seattle Public Utilities (SPU), have developed robust CAPs that reach a relatively high percentage of low-income customers (see text box examples of effective CAP strategies by SPU and DC Water). Examples of successful strategies for increasing CAP participation include:[129]

- Automatic enrollment for customers who participate in other assistance programs (e.g., Low-Income Heating and Energy Assistance Program (LIHEAP) or Supplemental Nutrition Assistance Program (SNAP)), or if this is not possible, offering categorical eligibility. Categorical eligibility streamlines the application process by only requiring proof that a household is already receiving another income-qualified benefit to enroll. Both PWD and NYC Department of Environmental Protection have successfully increased participation in their utility CAPs by auto-enrolling customers that receive benefits from other local and state assistance programs. In Jackson, Mississippi, the utility recently won a court case that allows them to use data from the SNAP to automatically enroll customers in their service area who receive this benefit.
- Partnering with third-party administrators, service providers, or CBOs who routinely work with customers who would benefit from CAP enrollment. These organizations often administer programs for utilities and/or conduct necessary outreach.
- Providing multiple opportunities to apply for assistance to reach people where they are, rather than providing a single option; for example, online, by mail, and in person at various locations, and in various languages.
- Using data to better understand and proactively market the program to the eligible population, especially to households with current water debt or a history of missed payments or shutoffs.

Despite a wealth of literature and case studies on best practices, many utilities still struggle to manage and implement effective CAPs. For example, while automatic enrollment through partnerships with other existing assistance programs has proven an effective strategy for some utilities, others have not been able to take advantage of these partnerships because of local or state restrictions on sharing customer data. Partnerships with third party service providers and trusted community organizations can reduce administrative costs and other barriers for utilities. However, even large, urban and/or regional systems serving large populations often have limited experience or connectivity with the low-income social service networks in their service areas.[130].

[129] See WRF 2010, WRF 2017, AWWA 2023, NRDC 2023

[130] LIWCAP report

Figure 5-6 and 5-7. Assistance Programs

DC Water Customer Assistance Programs

The District of Columbia Water and Sewer Authority, known as DC Water, provides water and wastewater services to the District of Columbia and wholesale wastewater services to the region. With about 127,000 accounts, DC Water strives to provide safe, reliable, and equitable water services to residents and businesses in Washington, D.C., and the region. DC Water has long recognized the financial challenges faced by some customers and has implemented some of the most robust customer assistance programs in the nation.

DC Water first offered the Customer Assistance Program (CAP) in 2001, providing a discount on the first 400 cubic feet of water for low-income residents at 60% of the State Median Income (SMI, the same threshold for the federal energy assistance program, LIHEAP). Over the years, the program has been enhanced and now offers various discounts, resulting in a 68% reduction in the average CAP household customer bill. The program was also expanded in FY 2004 to allow renters to qualify for the discount.

As rates continued to increase to support operations and capital investment, including the mandated Clean Rivers Program, DC Water expanded its programs by adding discounts for other income tiers. CAP2 offers a 45% discount off the average household bill to residential customers with incomes above 60% SMI and at or below 80% Washington Metropolitan Statistical Area Median Family Income (MFI). CAP3, funded by the District, offers a 12% discount off the total average household bill (75% of the Clean Rivers Impervious Area Charge) for customers between 80% and 100% MFI.

DC Water is authorized by law to provide customer discounts to "low-income" customers and has partnered with the District of Columbia Government to fund CAP3 as well as the Clean Rivers Impervious Area Charge (CRIAC) non-profit relief program. This program provides financial assistance to local non-profit organizations burdened by the CRIAC. CRIAC is an impervious area charge that funds the federally mandated DC Water Clean Rivers Project to reduce the discharge of combined sewage into the Potomac and Anacostia Rivers and Rock Creek. The $3 billion program began in 2008 and will be completed by 2030. The average residential property with 1,000 square feet of impervious area will pay $21.23 per month in FY2025.

Due to financial hardships during the COVID-19 pandemic, DC Water expanded its customer assistance programs by offering a new Emergency Relief Program and one of the first multi-family (apartments and condominiums) assistance programs in the country. The Emergency Residential Relief Program (ERRP) provided up to $2,000 in bill relief for CAP-eligible customers.

The Multi-Family Assistance Program (MAP) provided assistance to low-income residents living in multi-family housing units. This program offered a discount on water bills to tenants who were not directly billed by DC Water but lived in larger multi-family properties. To incentivize buildings to participate, DC Water allowed landlords to receive 10% of the credit, with the remaining passed to tenants. This was later increased to 20% to boost participation. From FY 2021 to FY 2023, the program provided $6.5 million in assistance.

Seattle Public Utilities (SPU) Utility Discount Program and other assistance programs

Program overview

SPU established its Utility Discount Program (UDP) in the 1980s. The program provides a 50% discount on water, sewer, and stormwater services for all households within the SPU service area who:

1) Earn 70% or less of the state MHI (based on their household size); and

2) Have an account in their name.

The typical monthly discount ranges from $80 to $105. Participants also receive free transfer station passes for garbage disposal needs.

Customers who do not receive a water / sewer bill may be eligible for the *UDP* if they receive a City Lights (electric) bill. The UDP provides a flat rate discount to these customers (on their electric bill) to help pay for water services. Customers in single-family, duplex, and multi-family homes are eligible, although discounts vary by household type. SPU also offers emergency assistance to single-family households who have an income at or below 80% of Washington state MHI (based on their household size) and who have an SPU or City Lights account in their name. Customers are eligible once per year, or twice if there are children in the household, for up to a $461 credit towards past due balances. SPU offers flexible payment plans, up to 120 days with customized minimum payments.

Funding and participation

Seattle's CAPs are funded through rate revenues. *UDP* provides nearly $20 million and emergency assistance provides $1.5 million in assistance annually. As of 2022, the UDP had 42,968 enrolled participants – approximately 50% of eligible households. This reflects a participation rate that is much higher than most utility-led CAPs.

Administration

The program is administered by Seattle Human Services, and the application for the bill discount is available online. Seattle advertises the *UDP* through partnerships with ethnic and local community groups, although translation and multi-lingual applications have proven to be difficult. Seattle requires only a forward-looking, self-reported estimate of household income to make it easier for customers to enroll in *UDP.* However, customers must verify income eligibility within six months. If they do not qualify at that time, they can no longer participate.

Lessons learned

SPU reports that the significant discount, in addition to the longevity of the program, likely contribute to the high enrollment rate. In addition to the water, sewer, and stormwater bill discounts, participants also receive a discount on their trash and electric bills when they sign up. Seattle has adopted creative strategies for targeting customers in need. They are one of a few utilities who provide direct discounts to multi-family customers who do not receive a water/sewer bill. Utility staff developed a predictive model using Census data to identify and target delinquent accounts that are likely eligible for a bill discount.

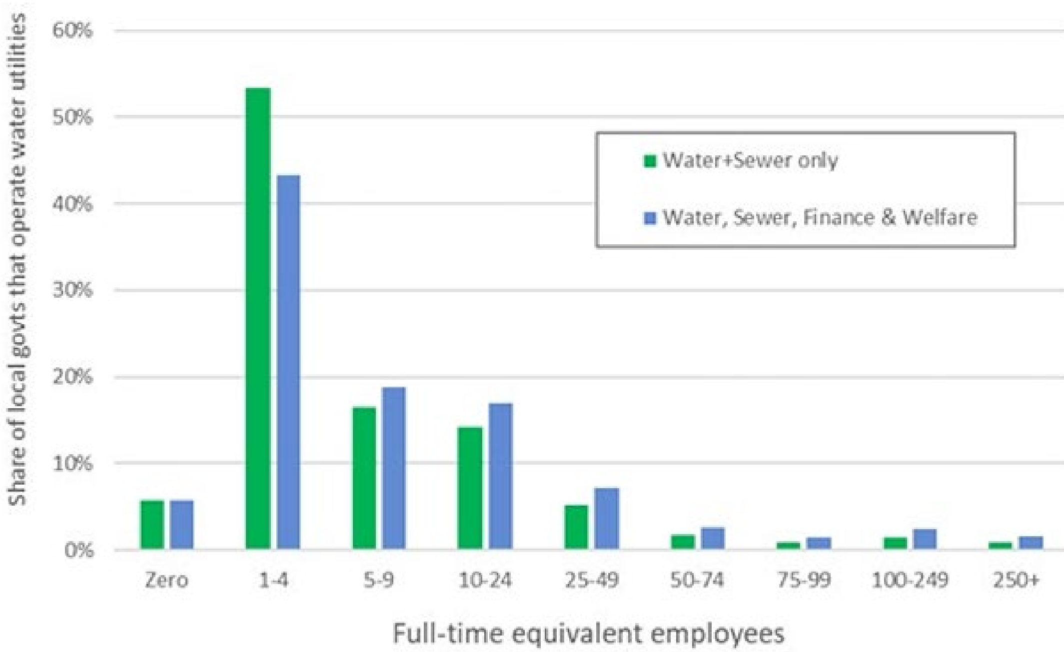
Source: Stantec/One Water Econ Sustainable Rate Structure Analysis for NYC DEP, Comparative Rate Structure Analysis, based on interview with SPU representative

5.2.3 High administrative costs/low capacity to administer

Fully addressing affordability with existing resources will be difficult for many utilities in the face of competing needs, including aging infrastructure, regulatory requirements, climate change, and cyber security threats, among others. For many utilities, this includes not only the monetary resources necessary to provide relief, but the human resources needed to administer and implement CAPs at a meaningful scale.

The graph below shows utility and finance staffing levels for U.S. local governments (municipalities, counties, and special districts) that operate water and/or wastewater utilities. Nearly 60 percent of local governments that operate water/wastewater utilities employ fewer than five full-time equivalent (FTE) staff. Nearly half (49 percent) employ fewer than five FTE when finance and welfare staff positions are included in this count. Many tribal and territorial water systems have similarly constrained organizational capacity. Utilities with such limited administrative capacity will struggle to perform the various administrative tasks involved in delivering and reporting on CAP benefits.[131]

Figure 5-8. U.S. Local Government Water and Wastewater Employment



Source: LIWCAP report based on data from 2017 U.S. Census of Governments.

5.2.4 Hard-to-reach customers

Many low-income households are “hard-to-reach,” meaning they pay for water and wastewater service as part of their rent or similar fees (e.g., condo or co-op fees, homeowner association fees). These

[131] LIWCAP report

customers do not have a direct relationship with a water or wastewater utility and do not benefit from traditional CAPs that provide discounts on water and wastewater bills.

An analysis using household-level data from the U.S. Census American Community Survey (ACS) Public Use Microdata Series (PUMS) characterizes the scope of the hard-to-reach challenge for low-income households.[132] As shown in Table 5-1, approximately 26.7 million households in the U.S. (20.6 percent of all households) earn less than 150 percent of the Federal Poverty Level (FPL) income for their household size.[133] Of those households, 41 percent live in multifamily buildings (compared with 22 percent of households above this income threshold). Multifamily households are much more likely to pay for water through their rent or similar fee because multifamily units typically are not individually metered. Similarly, a relatively high percentage of low-income households are renters, which as a group, are also more likely to fall into the hard-to-reach category.

PUMS also contains information on how households pay for water services. This data indicates that 26 percent of households earning less than 150 percent FPL pay for water/sewer as part of their rent, compared to 13 percent for households above that threshold. Another 18 percent of households indicate they "have no charge" for water or sewer. This likely means they have a private well and/or are on septic. It is worth noting that EPA estimates that approximately 15 percent of the U.S. population rely on private wells as their source for drinking water – this is the same as the percentage of households reporting no charge for water.

Table 5-1. Characteristics of low-income households and all U.S. households in relation to water utility bills

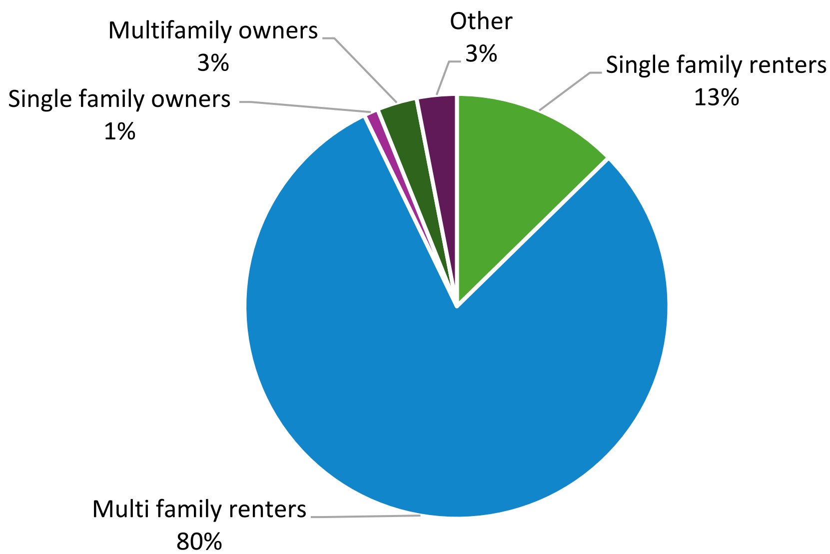
	U.S. households earning <150% FPL	U.S. households earning >150% FPL	All U.S. households
Occupied households	26.7 M (20.6% of total)	103.1 M (79.4% of total)	129.9 M
Single family	50%	74%	69%
Multifamily	41%	22%	26%
Other	9%	4%	5%
Renters	59%	29%	35%
Owners	41%	71%	65%
Pay for water through rent	26%	13%	16%
No charge for water	18%	14%	15%
Pay a water bill	56%	73%	69%

[132] Analysis conducted by One Water Econ

[133] The 150% FPL threshold is often used as qualifying criteria for local, state, and national assistance programs. For the purposes of this report, we use this threshold to characterize low income households across the U.S. The use of this threshold is not intended to define low-income populations or convey that this level of income is enough to meet basic needs.

Further analysis indicates that most of the 6.9 million low-income households indicating they pay for water through rent or similar fee, are multifamily renters. Figure 5-9 shows the makeup of low-income hard-to-reach households by household type and tenure.

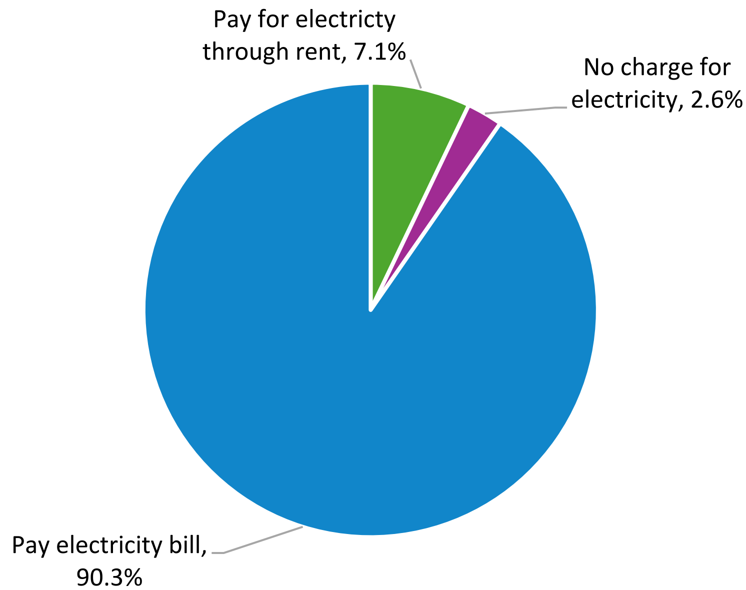
Figure 5-9. Hard-to-reach households earning less than 150% of FPL, by household type and tenure



Source: U.S. Census American Community Survey PUMS, 2022 1-year estimates

The hard-to-reach challenge is much less prominent in the energy sector, where sub-metering of multifamily units is common. The ACS also asks respondents to indicate how they pay for electricity, offering the same options as they do for water and sewer. As shown in Figure 5-10, 90 percent of households with incomes below 150 percent FPL indicate that they directly pay for electricity; this compares to 95 percent of all households.

Figure 5-10. Hard-to-reach households earning less than 150% of FPL, by how they pay for electricity



Source: U.S. Census American Community Survey PUMS, 2022 1-year estimates

In 2017, Water Research Foundation, published a report that documented strategies for assisting low-income, hard-to-reach customers and highlights several successful programs that have addressed it. One notable example is Seattle Public Utilities' Utility Discount Program (UDP), which provides a 50 percent discount on utility bills (on water, sewer, and stormwater) for households earning 70 percent of the state MHI (for their household size) who have an account in their name. Customers who do not receive a water/sewer bill can receive benefits from UDP if they receive an electric bill.[134] These customers receive a flat rate discount, which varies depending on household type, via their electric bill to help defray the costs associated with water and wastewater service.

Another program that addresses hard-to-reach households, albeit in a more indirect way, is New York City's Multi-Family Water Assistance Program (MWAP). This program offers a credit to owners of multifamily units (in buildings with 5 or more units) who receive assistance under a NYC Department of Housing Preservation and Development (HPD) or Housing Development Corporation (HDC) program for affordable multifamily housing projects. Eligible projects receive a $250 credit per affordable residential unit per year on their water and sewer bills. While MWAP does not provide a direct discount to low-income households, it indirectly benefits those facing affordability challenges by supporting the provision of affordable housing. To qualify for the program, developers must agree to keep the unit in affordable housing for at least 15 years. The building must also demonstrate efficient water use. During FY 2022, MWAP provided assistance to 964 DEP accounts, with credits totaling $11,925,000. Demand for the program has outstripped funding in recent years.

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[134] WRF 4557: Customer Assistance Programs for Multi-family Residential and Other Hard-to-Reach Customers.

Other programs have run into barriers trying to establish programs that reach multifamily households. For example, DC Water reports several challenges in implementing the Multi-family Assistance Program (MAP). To provide assistance to hard-to-reach tenants, DC Water needed to convince landlords, co-ops, and condo associations to participate and agree to pass the discounts to residents in the form of rental credits. Ultimately, DC Water determined that the administrative costs of this program were too high to continue permanently. Fewer than 200 owners participated, even with significant delinquencies among multifamily accounts (which account for more than half of total delinquencies).

5.3 State and federal efforts related to water affordability

5.3.1 State program and policy efforts

No state currently operates a permanent water affordability or assistance program; however, several have introduced or passed legislation that would support, or remove barriers to, state-level implementation. In 2021 Illinois enacted a law that creates a state-level water assistance program, but it is not yet operational, and participation by utilities is voluntary. A separate Illinois law, also enacted in 2021, creates a statewide assistance program applicable to customers of all utilities, but it becomes effective only when, and if, the legislature appropriates funds.

In California, New Jersey, and Michigan, legislation has been introduced to create permanent, statewide water affordability or assistance programs. Other states have directed or encouraged water and wastewater utilities to implement affordability or assistance programs and some have established minimum standards for those programs. For example, the California Public Utility Commission has encouraged the state's nine largest investor-owned water utilities to develop low-income assistance programs. California state lawmakers also passed legislation recognizing the human right to safe, affordable water. This has served as a foundation to frame additional legislation, programs, and policy. In Ohio, legislation was introduced to require all water utilities, both investor-owned and publicly owned, to establish affordability programs.[135]

5.3.2 National assistance program efforts

There is currently no national level assistance program that directly addresses water affordability. However, a national level assistance program could overcome many of the barriers described above. Efforts to create a national water affordability program have increased substantially in recent years, to some extent building on the Low-Income Household Water Assistance Program, the temporary relief program discussed above that was created during the COVID-19 pandemic to help low-income households pay their drinking water and wastewater arrearages (i.e., past due amounts) and current bills.[136] However, the program ended in March 2024, as states finished distributing their funds. Throughout its existence, LIHWAP was administered by the Federal Department of Health and Human Services (HHS) Administration for Children and Families' (ACF) Office of Community Services (OCS), the

[135] NRDC Water Affordability Toolkit

[136] The program was first authorized in December 2020, when Congress appropriated $638 million to the Department of Health and Human Services (HHS) to establish LIHWAP under the Consolidated Appropriations Act of 2021 (Public Law 116-260). Later, an additional $500 million was added under the American Rescue Plan Act of 2021 (Public Law 117-2).

same office that administers the Low-Income Heating and Energy Assistance Program (LIHEAP), a national assistance program that helps low-income households pay their energy bills.

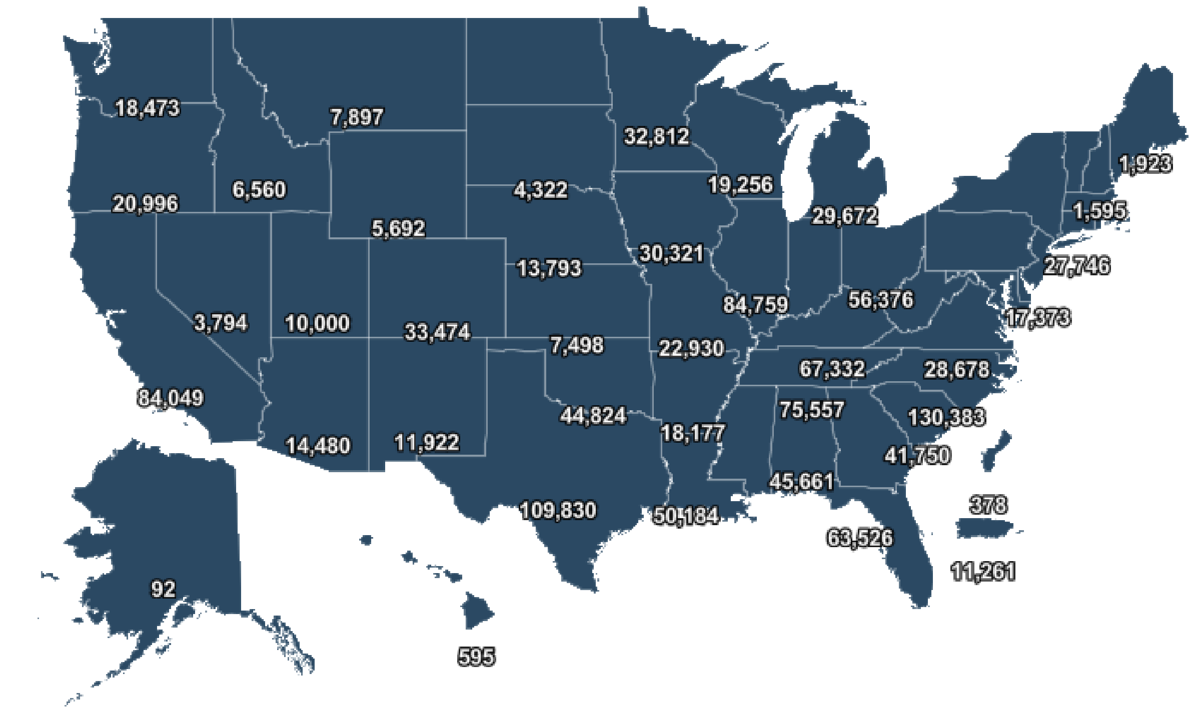
Under LIHWAP, funds were provided to water and wastewater utilities and not directly to residential water customers. HHS reports that in total, 1.7 million households received bill relief via LIHWAP, a relatively limited number of the total water burdened households in the U.S.[137] Figure 5-11 shows the number of households assisted by the state over the duration of the program.

LIHWAP provided states with flexibility in deciding how to administer and prioritize funding, for example, capping the amount of assistance provided, selecting eligibility criteria (based on guidance provided by HHS), and prioritizing how funding would be spent. Based on data published by HHS, LIHWAP funds were primarily used to restore or prevent service disconnections, covering late charges and arrears. A smaller percentage of funds were used to reduce rates for low-income households. HHS' national report shows that 53 percent of grant recipients (states) prioritized reduction of rates as an outcome of the program, while 98 percent and 100 percent prioritized restoring and preventing disconnections.

Since the end of LIHWAP, efforts to establish a permanent water affordability program have continued. In April 2024, several U.S. Representatives introduced the Low-Income Household Water Assistance Program Establishment Act (H.R. 8032) as a companion bill to Senate legislation introduced earlier in the year. This legislation would permanently establish low-income water assistance for families struggling to access affordable drinking water and wastewater services by permanently authorizing LIHWAP.

[137] See Section X above; LIWCAP

Figure 5-11. Households served by LIHWAP per state, end of program



Source: HHS

National water sector organizations and many CBOs have long advocated for the development of a national low-income water assistance program. In 2022, several water associations commissioned an evaluation of potential program design alternatives and administrative pathways for a federal assistance program.[138] Published in 2023, this study presents five options. Two options contemplate adding a water bill assistance component to existing federal programs largely to leverage their established administrative and outreach structures:

- LIHWAP 2.0 would refine, expand, and make permanent the existing LIHWAP program, perhaps combining its administration with LIHEAP's and extending its funding indefinitely.
- SNAP H20 would expand SNAP—the existing federal food program administered by USDA—to allow SNAP participants to use their benefits to pay for water and wastewater bills.

Three more alternatives considered by the team would establish a new Low-Income Water Customer Assistance Program (LIWCAP) overseen by EPA specifically for water and wastewater bill assistance:

- LIWCAP via Utilities would be funded through the EPA and administrated directly by water and wastewater utilities.

[138] Berahzer et al. 2023

- LIWCAP via Community Organizations would be funded through the EPA and administrated by community organizations.
- LIWCAP Hybrid would be funded by the EPA and administered by either utilities or community organizations, with state agencies determining specific administrative arrangements according to local conditions.

These options were evaluated against several criteria, including their likely reach (e.g., participation rates), administrative costs to relevant agencies, and the administrative burden required of customers to enroll and/or participate in the program. Pathway options were also evaluated based on the extent to which assistance would be available to hard-to-reach households or restricted to payment of water service provider bills. Evaluations referenced prior federal program precedents and extensive water sector experience. While no one report is definitive, for purposes of this document, this recent report provides several valuable insights. Table 5-2 summarizes the major attributes of the five alternative program pathways evaluated, including the federal agency that would be most likely to lead implementation under each pathway and each pathway's benefits and administrative attributes.

Table 5-2. Major Attributes of Alternative Administrative Pathways (Berahzer et al. 2023)

Pathway	Existing Federal Program Expansion		New Federal Program at EPA: LIWCAP		
	LIHWAP 2.0	SNAP-H2O	via Utilities	via Community Organizations	Hybrid
Federal agency	HHS	USDA	USEPA	USEPA	USEPA
Benefits					
High participation	★★	★★★★★	★	★★	★★★
Low administrative burden on customers	★★★	★★★★★	★	★★	★★
Benefits for hard-to-reach customers	★	★★★★★	★★	★★	★★
Ensures application of funds to water/wastewater accounts	★★★★★	★★	★★★★★	★★★★★	★★★★★
Equal benefits across customers, communities, and states	★★★	★★★★★	★	★★	★★
Flexibility for local needs	★★	★	★★★	★★★★	★★★★★
Administration					
Low administrative cost for utilities	★★	★★★★★	★	★★★	★★
Accessible to small utilities with low organizational capacity	★★	★★★★★	★	★★	★★
Low administrative cost for federal/state agencies	★★	★★★★★	★★	★★	★

Note: The 1-to-5-star rating indicates the project team's assessment of the relative merits of each pathway with respect to each attribute; 5 stars indicates a strong advantage, and 1 star indicates a marked disadvantage.

The attribute ratings shown in the table above highlight tradeoffs associated with alternative program models and administrative pathways. For example, while leveraging the existing federal SNAP program could efficiently deliver assistance with high participation rates, payments of water bills are not necessarily assured without implementing Electronic Benefits Transfer (EBT) technology on a broad scale across water utilities. The HHS administered LIHWAP program has established a sound administrative foundation that assures application of funds to water/wastewater accounts yet incurs relatively higher administrative costs and involves a more burdensome application process for customers and utilities alike. The LIHWAP program at EPA has a closer relationship with water and wastewater utilities yet no experience administering a national human service program (as HHS does).

There are, of course, other options beyond the five considered in the 2023 Low Income CAP study, and it is important to note that a number of CBOs representing environmental justice communities have put forward alternative views about the most effective approaches to establishing a national program to provide assistance with household water bills. A program that draws from key attributes of different pathways presented in the study could also be constructed. For example, an enhanced LIHWAP 2.0 could include significant new investment in outreach and technical assistance for utilities with limited administrative capacity (with attendant higher overall administrative cost). If paired with LIHEAP, this program could also provide assistance to hard-to-reach customers that receive LIHEAP benefits (i.e., similar to the SPU program described above but on a national scale). Any new federal program could include a range of different elements, from including using EBT cards to pay for water and wastewater bills, to new information technologies that ease administrative burdens of program participants and enhance program monitoring and reporting.

Rather than recommending a specific pathway for administration of a national household water assistance program, which is not within EPA's direct control, EFAB recommends several key objectives or principles that should be considered in the development of a such a program. These principles are derived from the growing body of studies on low-income household affordability and are set forth in the recommendation section below. A program that leverages pathways from other federal assistance programs (e.g., SNAP, LIHEAP) could reflect these principles in several ways. First, many of the administrative costs, verifying, and enforcing eligibility requirements would be well established which would have the advantage, in theory, reducing administrative costs.

Second, there is a growing consensus in the literature and direct experience that low participation rates in CAPs are due in large part to the "hassle factor;" gathering and documenting household eligibility is time consuming and/or daunting for many. Automatic enrollment or categorical eligibility related to other federal program(s) could reduce these barriers. As the 2023 report described above noted, if "program reach, efficiency, equity, and practicability are deemed principal criteria, then supplementing SNAP and making water and wastewater services SNAP-eligible expenses is likely the best way to address these criteria."

5.4 Customer Assistance Program Recommendations

Several of EFAB's recommendations related to rate structures are also applicable to this section as they include pathways for reducing legal barriers associated with funding CAP programs. In addition to those, EFAB offers the following recommendations related to CAPs.

23. **Offer planning grants to help utilities develop affordability programs/initiatives.** Offer planning grants to water and wastewater utilities to support the development of local affordability and/or assistance programs. As noted above, many utilities do not offer CAPs, and many are not well equipped to fully understand the affordability challenges within their community. Providing planning grants and technical assistance to develop and implement CAPs based on successful models could help utilities overcome capacity and resource limitations and other barriers.

24. **Articulate key principles and evaluate alternative pathways for a federal water customer assistance program.** Support development of a federal CAP for water and wastewater by

articulating key principles that should be included. Conduct a study to explore the advantages and disadvantages of alternative program pathways for providing such a program**.** <u>Key principles for a federal assistance program should include</u>:

- Focus on increasing assistance for those most in need rather than focusing primarily on helping utilities capture lost revenue from past due bills.
- Include renters and multi-family households (including households who do not pay their water bill directly to a utility), as these customers as a group typically face greater affordability challenges.
- Prioritize limiting the administrative burden on applicants and allow for automatic enrollment and/or categorical eligibility whenever possible.
- Prioritize limiting the administrative burden on local utilities (in keeping with observation that "water services sector did not evolve to address poverty relief and is acutely challenged to do so.")
- Prioritize limiting costs and administrative burdens on federal program managers by maximizing the use of existing, more or less well-functioning systems and organizations/agencies, and simplifying eligibility requirements.
- Embrace the principle of not allowing the perfect to be the enemy of the good; specifically planning for the reality that no program will reach every household in need, and that some will receive assistance who may not technically be as in need as others.

25. **Develop compendium of best practices and case studies of successful utility-led CAPs.** Develop a compendium of best practices and provide case studies of successful local, utility-led CAP programs, including those that have successfully overcome barriers related to enrollment/participation, hard-to-reach customers, and/or funding barriers. The compendium and case studies should be published semi-regularly (e.g., biennially), highlighting new and best practices in the field. Key information should include how utilities identified affordability challenges within their community and designed their programs accordingly, as well as successful outreach and enrollment strategies.

26. **Study the costs of nonpayment, shutoffs, and other aspects of unaffordable bills for utilities.** Commission a study to quantify the administrative and other costs associated with non-payment, and related service shutoffs, to help make the business case for CAPs. Conducting service shutoffs and managing arrangements is expensive and time-consuming, and these costs are covered of course primarily by rate revenue. Solid data on these costs are difficult to come by, however, and so it would be useful for EPA to provide a comprehensive review of the cost of pursuing consumers for non-payment in comparison to the costs of providing more effective customer assistance through the rate options outlined above.

Section 6 – Summary of Recommendations

This report provides significant information, resources, and related recommendations to EPA on the topic of water service affordability. Through the development of an affordability framework, EFAB has identified several ways that EPA can facilitate and support affordability-related efforts at the local, state, and federal level. Our recommendations constitute our response to the fifth component of EPA's affordability charge:

> *Provide recommendations on ways that EPA could support legal arguments and develop supportive policy for providing customer assistance and provide leadership in guiding program implementation. These recommendations would recognize that EPA's role is not directive but limited to providing resources and guidance that could be useful to states in navigating affordability issues.*

The 26 recommendations provided throughout this report are presented within the context of the affordability framework, identifying actions that EPA can take to enhance affordability across the framework's five key focus areas: capital investments, operational efficiencies, federal funding, rate structure design, and customer assistance. Our recommendations also span a range of actions. Some recommendations, such as compiling and updating affordability resources to build a comprehensive EPA affordability website, will be relatively easy to implement. Others, such as working with external partners to issue a policy statement on expanding the cost-of-service framework, may take more time and effort but also have the potential to have a significant impact.

To help EPA navigate the range of recommendations presented in this report, we have grouped them into the following action categories:

- Comprehensive Affordability Website (1 recommendation)
- SRF Additional Subsidy (3 recommendations)
- Technical Assistance and Planning Grants (2 recommendations)
- Incentives (2 recommendations)
- Studies/Information Gaps (8 recommendations)
- Policy and Guidance (5 recommendations)
- Case Studies/Best Practices (5 recommendations)

The table below summarizes EFAB's recommendations by planning category and framework element (the numbering reflects the numbers assigned to each recommendation throughout this report for ease of reference).

Table 6-1. EFAB's Recommendations by Planning Category and Framework Element

Action Category		Description	Framework element
Comprehensive affordability website (1)			
4	Create a comprehensive EPA affordability website.	Create a new affordability page on EPA's website that repurposes, updates, and integrates EPA's current set of resources related to each component to the EFAB affordability framework. The website should incorporate resources related to each section outlined in this report.	All
SRF Additional Subsidy (3)			
15	Create a pilot program to implement the CWSRF Additional Subsidy for low-income households.	Identify water utilities that are interested in partnering with their state CWSRF program to pilot a project that could be awarded loan funds with additional subsidy to channel to low-income utility ratepayers within the service area.	Federal funding
16	Develop guidance toolkit to help SRFs implement the CWSRF Additional Subsidy for low-income households.	Develop a guidance toolkit advising SRF programs managers of the opportunity to program SRF funds to low-income customers, including ways to award, set up the funding, work with a utility, and push the administrative burden of the program to the benefiting utility. Eventually the guidance toolkit should be revised to incorporate lessons learned from program pilots.	Federal Funding
17	Continue to explore approaches for defining DACs under DWSRF.	Build on EPA's existing effort to identify key elements that would reduce disparities among households resulting from state DAC definitions. This exercise would, of course, require considerable sensitivity to the fact the states have broad discretion in this regard and address widely different circumstances nationwide.	Federal funding
Technical Assistance and Planning Grants (2)			
21	Provide enhanced technical assistance for utility rate development.	Provide technical assistance to utilities for rate development, particularly for mid-sized utilities and for stormwater fees. Many of the University EFCs throughout the U.S. are well suited to provide this assistance, and some already do.	Rate structures and design
23	Offer planning grants to help utilities develop affordability programs/initiatives.	Many utilities do not offer CAPs, and many are not well equipped to fully understand the affordability challenges within their community. Providing planning grants and technical assistance to develop and implement CAPs or other affordability initiatives based on successful models could help utilities overcome capacity and resource limitations and other barriers.	Customer assistance programs

Incentives (2)			
8	Create PISCES and TAURUS awards for non-traditional water infrastructure.	Create distinct PISCES and TAURUS awards that recognize the most innovative non-traditional water infrastructure projects funded by the DWSRF and CWSRF in each of five categories: conservation-based, distributed, nature-based, digital, and regional water infrastructure.	Capital investments
14	Develop federal incentives for utility asset management programs.	Develop incentives for water utilities to implement asset management programs focused on maintaining utility fiscal health. Options could include, but not be limited to 1) Justice40 Credits, and 2) eligibility for higher levels of additional subsidy	Operational efficiencies
Studies/Information Gaps (8)			
1	Commission study on relative costs of alternative infrastructure investments.	Commission a comprehensive study documenting utility and regional data on the lifecycle costs of green, distributed, nature-based, digital, and regional water infrastructure options implemented nationwide. This would be extremely valuable to communities and utilities seeking tangible information about how the cost of these strategies has played out in other areas.	Capital investments
2	Identify standardized approach for assessing the life cycle benefits and costs of distributed and nature-based water infrastructure alternatives.	Identify a standardized approach to assessing the lifecycle benefits and costs of distributed and nature-based water infrastructure alternatives (including water use efficiency, source water protection, watershed restoration, GSI, water reuse) that allow for an apple to apples comparison with conventional infrastructure approaches. This would involve compiling and refining approaches that have been developed to date, not reinventing the wheel. While much work has been conducted on this topic, it can be hard to access and/or to adapt to specific utility circumstances.	Capital investments
7	Develop a biennial publication highlighting case studies of non-traditional water infrastructure.	Develop biennial publication highlighting case studies and lessons learned related to nature-based, digital, green and other forms of non-traditional water infrastructure for distribution to states and local governments. Ideally these case studies would be widely amplified not only through EPA's networks, but through the EFCs, academics, NGOs, CBOs and others capable of reaching a wide audience.	Capital investments
9	Study impact of alternative project delivery models on lifecycle costs of water infrastructure.	Commission a study on the impact of various project delivery strategies on the lifecycle costs of water infrastructure projects.	Capital investments
10	Evaluate legal barriers to alternative project delivery models.	Commission a study of current state and local ordinances that allow or prohibit various water project delivery strategies, with lessons learned and tools (e.g. model ordinances) for overcoming identified barriers.	Capital investments

12	Initiate series of workforce development studies.	Initiate a series of studies to improve workforce development in the water sector. While STEM skills are important, the water sector also requires strong leadership and management skills that are not often integrated into STEM programs. Studies that EPA could implement would ideally serve as a foundation for improved local capital improvement programs.	Capital investments
22	Study the effect of alternative rate structures on affordability.	Commission studies to explore key rate-related affordability issues, including: 1) Advantages and disadvantages of income-indexed rates, focusing on the financial impacts to utilities and customers; and 2) Impact of best practices for rate design on utilities and low-income customers.	Rate structures and design
26	Study the costs of nonpayment, shutoffs, and other aspects of unaffordable bills for utilities.	Commission a study to quantify the administrative and other costs associated with non-payment, and related service shutoffs, to help make the business case for CAPs. Conducting service shutoffs and managing arrears is expensive and time-consuming, and these costs are covered primarily by rate revenues. Solid data on these costs are difficult to come by; it would be useful for EPA to provide a comprehensive review of these costs compared to the costs of providing more effective/proactive customer assistance.	Customer assistance programs
Policy (5)			
5	Expand EPA Integrated Planning Guidance and related policy to include drinking water regulations.	Revise EPA's integrated planning guidance to incorporate more of a "One Water" approach. Specifically, this would include incorporating compliance with drinking water regulations, in addition to wastewater and stormwater requirements, into EPA's Integrated Planning Process. Integrated planning identifies efficiencies, benefits, and affordability to best prioritize capital investments and achieve human health and water quality objectives. Integrated planning should balance compliance timelines with affordability, and the ability to assist low-income households, and prioritize projects (and mandates) that provide the greatest benefit to ratepayers.	Capital investments
6	Develop metrics and an affordability screening tool to help utilities integrate affordability into capital planning/investment decisions.	Develop metrics and an affordability screening tool that utilities can integrate into their capital investment decision making. EPA has developed something like this in its FCA Guidance in the context of regulatory compliance; but this could be revised as an optional tool for utilities seeking to elevate local affordability issues in decision making. It could include, for example, measures of success that would allow utilities to examine forecasted spending against financial and affordability objects.	Capital investments

18	Develop a policy statement that recognizes the benefits of expanding the cost-of-service framework to incorporate affordability/public health.	Issue a new EPA policy supporting expansion of the cost-of-service framework to include public health and affordability. Establishing such a policy would recognize that customers receive significant benefits when all residents in a community have access to clean and reliable water services. This effort would provide a stronger legal basis for funding CAPs or income-indexed rates through rate revenues by providing a nationally endorsed approach for cost-of-service ratemaking. It would be useful to work with national water sector organizations and other key stakeholders (including potentially EFAB) in developing this policy.	Rate structures and design
19	Incorporate utility affordability actions/efforts into federal funding decisions.	Incorporate prioritization criteria related to how well utilities are addressing affordability (e.g., through rate design and/or CAPs) into federal water and wastewater infrastructure funding/financing program decisions. Specifically, EPA should develop criteria for state level SRF programs providing higher point values for utility applicants that are addressing water affordability challenges proactively and effectively. There is precedent for this prioritization via EPA's updated FCA Guidance Financial Alternatives Analysis. These criteria could also apply to WIFIA loans and other federal water infrastructure funding sources.	Rate structures and design
24	Articulate key principles and evaluate alternative pathways for a federal water customer assistance program.	Support development of a federal CAP for water and wastewater by articulating key principles that should be included. Conduct a study to explore the advantages and disadvantages of alternative program pathways for providing such a program. Key principles should include those outlined by EFAB in report Section 5.4.	Customer assistance programs
Case Studies and Best Practices (5)			
3	Elevate/highlight tools that have been developed for quantifying and valuing the co-benefits of nature-based infrastructure.	Elevate and highlight tools that have been developed for quantifying and valuing the co-benefits associated with green infrastructure, energy efficiency (e.g., generating energy onsite), and other non-traditional water infrastructure, such as reduced urban heat island effect, creating more urban green space, economic and workforce development, and improved air quality, among others. While distinct from Recommendation 2, ideally these efforts would be closely integrated.	Capital investments
11	Highlight long-term capabilities needed to effectively implement and maintain water infrastructure projects.	Develop high level suggestions and ideas for how utilities can best organize to have the long-term capabilities needed to carry out the planning, designing, building, operating, and maintaining of water system capital improvement projects. These capabilities should ideally include incorporating quality-based selection processes.	Capital investments
13	Develop case studies to highlight successful asset management programs.	Commission a review of 12 to 24 successful water utility asset management programs that have resulted in significant cost savings.	Operational efficiencies

20	Provide examples of state statutes that may allow for funding CAPs and/or incorporating public health/affordability into cost-of-service rate practices.	Provide examples of model state statutes that allow for funding of CAPs with rate revenues and/or incorporating public health and affordability into cost-of-service rate practices, either expressly or in the absence of a prohibition.	Rate structures and design
25	Develop compendium of best practices and case studies of successful utility-led CAPs.	Develop a compendium of best practices and provide case studies of successful local, utility-led CAP programs, including those that have successfully overcome barriers related to enrollment/ participation, hard-to-reach customers, and/or funding barriers. The compendium and case studies should be published semi-regularly (e.g., biennially), highlighting new and best practices in the field. Key information should include how utilities identified affordability challenges within their community and designed their programs accordingly, as well as successful outreach and enrollment strategies.	Customer assistance programs

Water affordability is one of the more challenging issues facing EPA and the nation today. We commend the agency for its engagement on the complexities involved in working to ensure that people and communities nationwide are able to afford safe and healthy drinking water, as well as wastewater and stormwater management services. EPA has a key role to play in providing states, Tribes, and communities with the resources, tools, data, and information they need to make the best possible decisions for their customers. We are hopeful that this report will provide a meaningful basis for continued and expanded progress going forward.