

# A Twenty-Year Review: Revisiting the Drinking Water and Wastewater Infrastructure Funding Needs and Gaps in the Appalachian Region

## Executive Summary

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# Executive Summary

Drinking water provision and wastewater removal are critical services that require substantial costs to build, maintain, and upgrade the necessary underlying infrastructure. Despite significant recent federal investment, funding gaps remain, though their full scope is not well defined. This is particularly true for Appalachia, given its challenging environment of rugged terrain, dispersed populations, and limited financial resources.

The last review of Appalachia's infrastructure was completed 20 years ago by a team from the School of Government Environmental Finance Center (SOG EFC) at the University of North Carolina-Chapel Hill. To help understand the complex landscape of water and wastewater infrastructure throughout Appalachia, a team of researchers from SOG EFC and Virginia Tech undertook an in-depth analysis using both quantitative and qualitative approaches. The results address six key questions to inform both the current state of water and wastewater infrastructure and future opportunities throughout the region.

## **What is the current state of water and wastewater infrastructure in Appalachia?**

Appalachian communities rely on both centralized and decentralized (e.g., onsite private wells or septic tanks) systems for drinking water access and wastewater treatment. Centralized systems, managed by governments, non-profits, or private companies, are subject to federal service quality regulations. In contrast, decentralized systems are maintained by individual owners and face fewer regulatory requirements.

Overall, the results suggest that more Appalachian households appear to be connected to centralized drinking water services compared to the early 2000s. The total number of systems has declined while both the percentage of population served by larger systems and the overall population coverage by centralized systems have increased slightly (approximately six percentage points and four percentage points, respectively). These results point to regionalization or consolidation of smaller systems into larger ones, consistent with national trends. However, the percentage of the Appalachian population served by larger systems (73%) still lags behind the U.S. as a whole (84%), and a slightly larger percentage of the population relies on smaller systems, which tend to have higher costs. A higher percentage of the Appalachian population (more than 80%) also relies on community water systems with surface water sources, which require more treatment and are often associated with higher costs.

Aging and inadequate infrastructure remain a primary concern for surveyed operators throughout the region. Health-based Safe Drinking Water Act (SDWA) violations occur at similar rates in Appalachia and in non-Appalachian areas. The project team also found evidence that Appalachian systems are able to address changes in regulatory requirements. Rates of monitoring and reporting violations, however, are higher within Appalachia. Comparisons of bottled water sales and SDWA violations suggest that Appalachian households may turn to bottled water during times that centralized water systems are out of compliance, regardless of the type of violation.

Assessing centralized wastewater infrastructure was difficult due to limited data. Up to 76% of the population lives within three miles of a centralized wastewater system, but proximity does not guarantee service, particularly in mountainous terrain.

For both water and wastewater, complete coverage is unlikely anywhere in the U.S. as some areas will always be too rugged, remote, and/or economically challenged to effectively and efficiently serve with traditional centralized systems. Private wells and septic systems, along with the practices of water hauling and releasing untreated wastewater, still exist in parts of the region. However, the proportion of the remaining population that could feasibly be connected to centralized water or wastewater service is unclear. Most Appalachian states have assistance programs to provide education and water quality testing for private well owners, but programs for septic systems do not exist, despite concerns that onsite wastewater failure is a likely source of well water contamination.

### **What are the critical infrastructure needs in the region?**

Using the most recent EPA Clean Watershed and Drinking Water Needs Surveys, the project team estimated at least \$55 billion in documented water and wastewater infrastructure needs: \$32.5 billion for wastewater and \$22.5 billion for drinking water. These total needs translate to about \$2,500 per capita across the region. Metro areas account for about 75% of the total needs with rural areas only accounting for about 10%.

For wastewater, infrastructure needs for conventional, centralized services account for about \$25 billion. Broadly, these types of needs address issues related to traditional wastewater treatment, infiltration and inflow, sewer replacement and rehabilitation, wastewater transfer to facilities for treatment, and sewer overflow. Adding needs related to water reuse and decentralized systems increases the total by about \$7 billion. Importantly, this category only captures needs related to the rehabilitation, replacement, or new installation of onsite or clustered community systems. Needs related to connecting decentralized users are captured in the more conventional categories. The drinking water infrastructure needs estimate of \$22.5 billion only includes surveyed systems, about 7% of all systems in Appalachia. Extrapolating surveyed data to all systems increases the estimate to about \$55 billion. Including extrapolated data increases the total combined need (drinking water and wastewater) to approximately \$87 billion.

### **What capital funding sources are currently available to meet those needs?**

Funding for water and wastewater projects is available through federal, state, non-profit, and private financing sources. Between fiscal years 2021 and 2024, federal investments in Appalachian water and wastewater infrastructure totaled about \$1.1 billion, with the largest funding sources being Community Development Block Grants and the EPA's State Revolving Fund Programs. State governments and non-profit organizations also offer funding opportunities, though the types of programs and funding available vary widely between states. Private financing tools, such as revenue or green bonds, are typically accessible only to larger systems, limiting their usefulness for much of the region. However, innovative financing solutions, such as state bond banks, can increase the accessibility of private financing to smaller systems. Five states in the Appalachian Region (Kentucky, New York, Ohio, Virginia, and West Virginia) offer this option to water and wastewater utilities.

## **What types of funding gaps exist, and what is the capacity to bridge them in communities across Appalachia?**

Despite substantial recent federal investment, significant funding gaps remain, as evidenced by an estimated minimum of \$55 billion in infrastructure needs compared to about \$1.1 billion in recent disbursements. State, non-profit, and private financing sources provide additional funding, but external funding sources cannot currently cover all water and wastewater infrastructure needs. Some capital costs will ultimately need to be covered by customer rates. Although average annual customer bills tend to be higher in Appalachia relative to the non-Appalachian areas of Appalachian states, combined costs are generally 2% or less of median household income. This percentage is well below the conventional affordability threshold of 4.5% for combined water and wastewater services. However, it should not be assumed that all customers can easily absorb higher rates throughout the region or that the funding gap can be closed with rate increases alone.

In addition to a gap in the amount of funding available, there are also gaps in the capacity to access funding. Application processes can be arduous, putting additional strain on utility staff that may already be over-capacity. The less conventional approaches that may be the most feasible in the rural landscape of Appalachia may fall outside current funding priorities, making applications for those projects less competitive. However, local development districts (LDDs) provide support for grant and/or loan applications and administration. LDD staff also often serve as liaisons between utilities and either state or regional funding agencies, making them important partners for utilities in accessing funding for critical infrastructure projects.

## **What financial management and funding strategies are likely to have the biggest impact on service in the region?**

Many traditional financial management practices hold true for Appalachia, such as long-term planning, setting appropriate rates, and data-driven decision-making. However, small innovations to these traditional approaches can make a big difference to communities throughout the region. For example, the benefits of economies of scale are well-known but can be hard to realize in more rural areas. However, the City of Cullman (Alabama) adopted a unique approach of not marking up the cost of its wholesale water to encourage wholesale customers to join the system and create an economy of scale. Cullman also financed a regional reservoir by securing long-term agreements requiring each town served to purchase water until project costs were recovered. Fostering a culture of collaboration was key to Cullman's success in obtaining these agreements.

Long-term planning may be of particular importance in Appalachia. Though many utilities create asset management plans, the City of Ironton (Ohio) views its plan as a living document. Constantly updating the document requires time investment from city staff, but they leverage external partnerships to expand their capacity because the benefits of having a regularly updated plan are substantial. Newly elected officials can quickly get up to speed and utility staff can capitalize on short funding windows, knowing there is an up-to-date list of high-priority projects available. This ultimately reduces the staff time and effort required



to apply for funding. Planning ahead can also position a utility to take advantage of future growth opportunities with less financial investment. The Town of Mars Hill (North Carolina) used the opportunity of building an interconnection with a neighboring town to also install infrastructure that will enable the town to expand service to an area primed for growth.

Expanding funding program options could also have a significant impact. Many utilities lack the financial resources to maintain new or updated infrastructure, leading to avoidable degradation and repeated major investments in the same infrastructure. Ideally, costs for ongoing maintenance would be covered by ratepayers, though this outcome may never be achievable for smaller systems in Appalachia. Creating funding opportunities for ongoing maintenance may ultimately result in long-term cost savings and a more efficient use of funds. Appalachia also offers a promising testing ground for innovative solutions aimed at closing service gaps in some of the most rural and rugged areas of the U.S. Providing financial incentives and development grants to support the exploration of emerging technologies in remote areas may not only benefit local residents but also potentially serve as a model for other rural regions across the nation.

Finally, given the importance of LDDs as utility partners, funding LDD outreach and capacity building may be an efficient avenue to increase access to funding and indirectly increase the capacity of utility staff. Expanded in-person outreach by LDD staff may expand their reach and enable them to connect with more utilities throughout their districts. Annual, state-specific trainings for LDD staff covering available funding programs, application processes, and common pitfalls could help promote consistent knowledge across LDDs. Further, funding training on key topics such as long-term planning, project implementation, or regionalization options may prove an efficient mechanism to increase utility capacity rather than training utility staff directly. LDD staff can then disseminate the information learned throughout their districts based on localized needs.

### **What steps can funding agencies and technical assistance providers take to improve and expand service across Appalachia?**

In addition to expanding funding options, a few changes to program administration could have a positive impact on the ability of Appalachian utilities to access infrastructure funding. As previously noted, conventional approaches to infrastructure are not always the most feasible in Appalachia. Adjusting funding program priorities to reflect the constraints of working within the Appalachian landscape could make less conventional, but more practical, projects more competitive. Further, streamlining funding processes, such as one application for multiple programs, can also reduce the time burden of applying for funding on utility staff.

Providing targeted technical assistance would also be impactful. Specific assistance to ensure compliance with SDWA monitoring and reporting (MR) requirements may reduce MR violations, improving the public's perception of centralized water system quality and potentially reducing the use of bottled water resources. Providing specialized support for the most distressed systems, which also typically struggle with reduced funding options, could improve the capacity of these systems to access much-needed financial support. Lastly, given that full coverage by centralized services is highly unlikely in the rugged terrain of

Appalachia, expanding support for users of private wells and septic systems would help owners ensure the integrity of their systems and reduce environmental and health hazards caused by ineffective onsite infrastructure.

Technical assistance roundtables could promote knowledge sharing across providers, particularly LDDs. The varying circumstances throughout Appalachia means that no single strategy, or even suite of strategies, will be effective throughout the entire region. However, many innovative strategies for both centralized systems and decentralized users already exist and are replicable. Though directly assembling utility staff across Appalachia may not be feasible, creating opportunities to bring LDD staff together could facilitate more effective sharing of lessons learned and innovative strategies across the Appalachian Region.

Overall, the future of Appalachian water and wastewater service will depend on a unique combination of traditional investment, innovative solutions, and collaborative approaches tailored to a range of local conditions. The region faces significant challenges, but also substantial opportunities. By expanding funding opportunities, increasing targeted technical assistance, and facilitating peer learning—while recognizing that one-size-fits-all strategies rarely work—funders and partners can help utilities extend safe, reliable, and affordable centralized service and support decentralized users throughout the region for decades to come.