The future of water in the US

Navigating toward resilience

2026

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Introduction: The rising tide of urgency

The water sector in the United States (US) is at an inflection point. The converging challenges of aging infrastructure[1], constrained supply, and accelerating demand are straining a fragmented network of more than 50,000 community water systems[2] that are responsible for consistently supplying over 320 million customers, or approximately 95% of the US population, with safe and clean water.[3] The frequency and severity of extreme weather events, exacerbates water supply stress.[4] At the same time, contaminants such as lead, polyfluoroalkyl substances (PFAS), and contaminants of emerging concern (CECs), such as pharmaceuticals, increasingly threaten water quality. [5,6,7] Public trust is continually tested by both legacy issues (e.g., chronic underinvestment) and emerging risks (e.g., cybersecurity).[8,9,10]

The public can view water as both easily accessible and inexpensive, which often does not align with reality water utilities are facing.[11] Unlike roads and highways, water infrastructure is mostly underground, and its age and deterioration are not visible to public. Utilities face obstacles in establishing rates that fully reflect the full cost of service, which in turn hinders efforts to invest adequately in ongoing system maintenance and improvements[12] The persistent underpricing can result in deferred replacement and maintenance, leaving many systems increasingly susceptible to frequent physical failures and leaks. Limited financial resources can also restrict the adoption of advanced technologies that could enhance water conservation and quality, enable better asset management, build the long-term resilience needed to address emerging challenges, and improve overall customer experience. Beyond infrastructure challenges, utilities also face a looming workforce gap. Estimates suggest that one-third of water utility employees will be eligible to retire within the next decade, which threatens the preservation and transfer of institutional knowledge to the future workforce.[13]

In response to these mounting challenges, many US water utilities are focusing on essential improvements to strengthen system resilience. Infrastructure upgrades remain a priority, with utilities working to replace aging pipes and update treatment facilities as funding allows often relying on state and federal support. Adoption of new technologies, such as advanced leak detection or asset management tools, is occurring but typically at a measured pace due to budget and resource limitations.[14] Some utilities have begun to explore pilot projects for addressing emerging contaminants like PFAS, as well as updating practices to improve cybersecurity and risk planning.[15] However, sector-wide adoption of advanced automation and workforce development programs is gradual, reflecting ongoing resource constraints and the difficulty of attracting new talent.

Despite these challenges, utilities appear committed to their core missions of protecting public health and maintaining a reliable supply of clean water for their communities.

> "Water is the only utility we ingest and maintaining customer trust is paramount. From a problem-solving perspective and a societal perspective, as well as from a financial perspective, the Water sector in the US is in dire need of modernization to maintain that trust."
>
> **JOHN GRIFFITH, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN WATER (NYSE: AWK)[16]**

Though these challenges have been identified and the industry is making advances to address them, several uncertainties, including the pace of technological advancement, economic volatility, shifts in customer expectations, and weather variability, have the potential to amplify these known forces and introduce new risks. The presence of these uncertainties may complicate the ability for water utility leaders to accurately plan for the future.

Addressing uncertainty lies at the core of our analysis. In the following sections, we begin by explaining how scenario planning can assist with navigating current and emerging uncertainties. We then explore four potential futures for the US water sector, highlighting the risks and opportunities each may present, along with sample actions that organizations can consider taking today, regardless of how the future unfolds. In doing so, we set out to initiate an exploration of the following question:

How can US water utilities adapt their investment priorities, service innovations, and operating models to build greater resilience and meet or exceed customer expectations over the next 10–15 years?

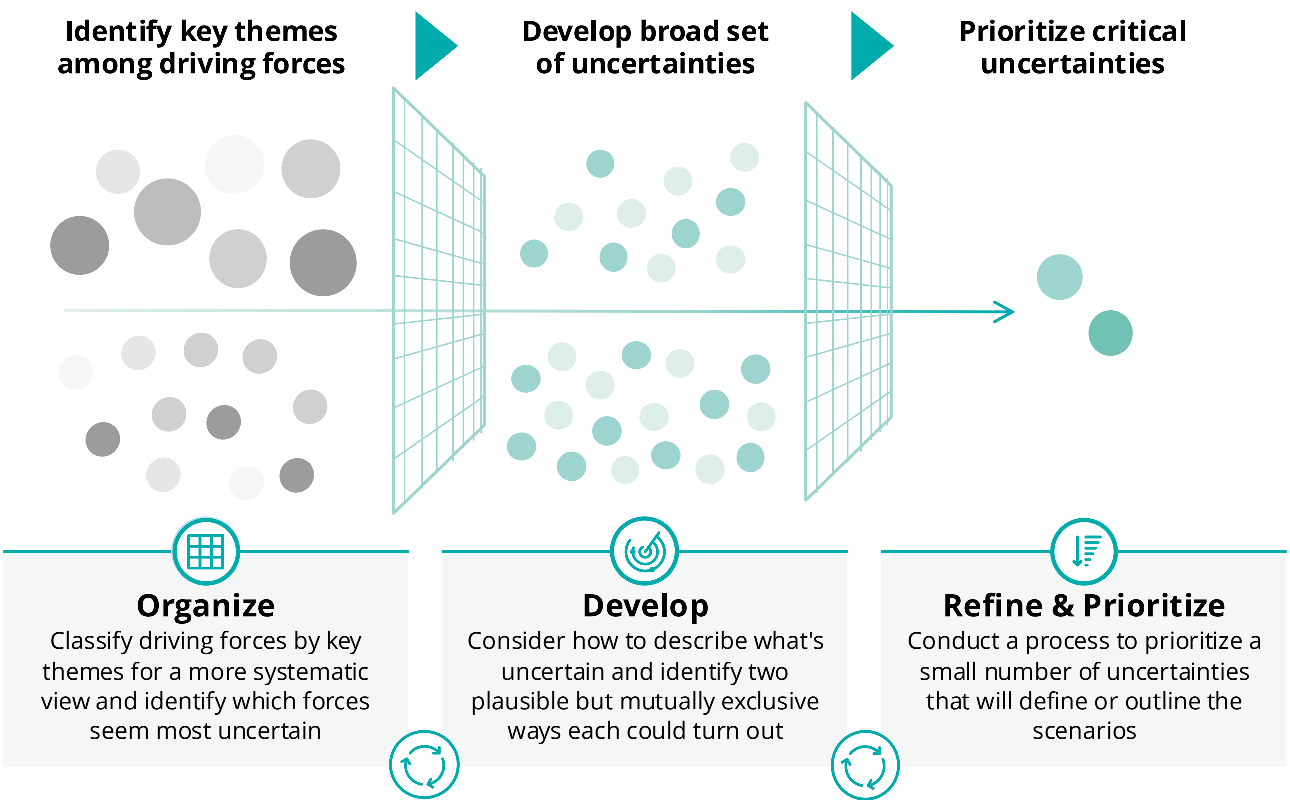
However, to properly address this strategic challenge, we must first understand:

How might customer water needs and expectations evolve, and how could water availability stressors change in the US by 2040?

Embracing uncertainty to build strategic advantage

Deloitte's scenario planning methodology starts with an exploration of "known unknowns": factors that are uncertain yet have the greatest potential to reshape the future. We then select the two most critical uncertainties to construct four divergent, yet plausible scenarios. These scenarios are not forecasts, nor do they assign probabilities or preferred outcomes. Instead, they are meant to provoke discussion, with the aim of helping utilities stress test strategies, anticipate surprises, and identify risks and opportunities that might otherwise be missed.

Exploring future scenarios aligns stakeholders around the long-term vision and prioritizes smart-bet moves or actions that water utility leaders can take today to prepare. While our scenarios are designed to capture broad uncertainties, they are built to be adapted. Each scenario provides a foundation that water utilities can tailor to reflect their specific questions about the future based on geographic context, strategic priorities, risk profile, investment options, and customer needs.



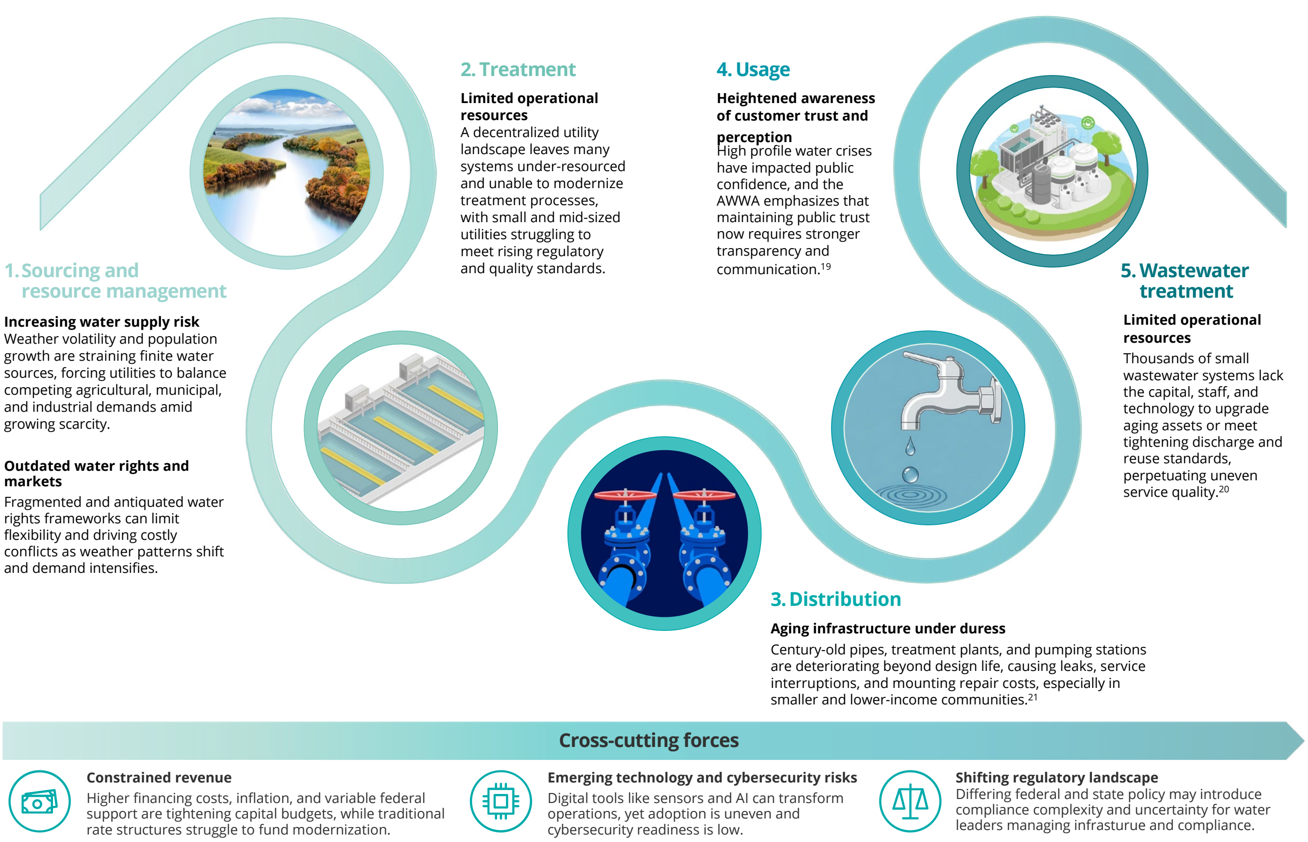
A sector under strain but on the brink of transformation

The urgency for strategic planning in the US water sector stems not only from external challenges, but also from the need to accelerate and modernize long-term planning. While some utilities develop multi-year strategic plans, others may lack comprehensive asset management plans and the tools necessary to better manage across infrastructure life cycles. Instead, day-to-day decision making is often driven by short-term, annual budget cycles.[17] In the absence of structured planning, ad-hoc fixes to pressing issues become a more frequent option, which can contribute to infrastructure decline. A disconnect begins to form between long-term objectives and short-term decisions which can leave utilities unprepared for emerging disruptions and unable to fully capitalize on transformative opportunities. The severity, speed, and complexity of current challenges may further complicate planning coordination across different time horizons. Such challenges include competing demand for water across customer segments, technological advancements, overexposed or single source water supplies, prolonged droughts in parts of the Western US, and flooding and wildfires that contaminate water sources and overwhelm treatment systems. While planning for these seemingly disparate events can feel overwhelming, focusing on the underlying systemic trends enables utilities to navigate the evolving market with greater clarity.

> "The challenges water utilities face today are escalating at lightning speed. Water systems are becoming more complex at the very moment public expectations remain high and affordability pressures are intensifying. Utilities must modernize aging infrastructure, adapt to climate risks, and defend against cyber threats all while educating customers on what it truly takes to deliver safe, reliable water."
>
> **JANISSE QUINONES, CEO, LADWP[18]**

Water rights and markets: Legacy legal frameworks governing

Key market forces across the water services lifecycle



Case study—Events which have reduced public trust in water systems

The contamination at Marine Corps installations, where unhealthy levels of chemicals in the water supply have been linked to health problems among residents and military personnel[12], further demonstrates the long-term consequences of inadequate source water protection and delayed response. The widespread detection of PFAS, or "forever chemicals," in water supplies across multiple states highlights associated public health risks and potential gaps in regulatory processes. Additionally, frequent boil water advisories and service disruptions,[23] such as those following the 2021 Texas winter storm Uri,[23] have contributed to to public interest in understanding water management. More recently, in 2025, the EPA announced extensions of compliance deadlines for PFAS regulations, leaving communities facing continued uncertainty about the safety of their water. [25] This has elevated pressure on state, local governments, and utilities to enact their own drinking water standards and mitigate water quality risks.

Water rights and markets: Legacy legal frameworks governing water rights and transfers are increasingly strained by environmental stressors and population migration and growth, contributing to higher costs and supply constraints for utilities.

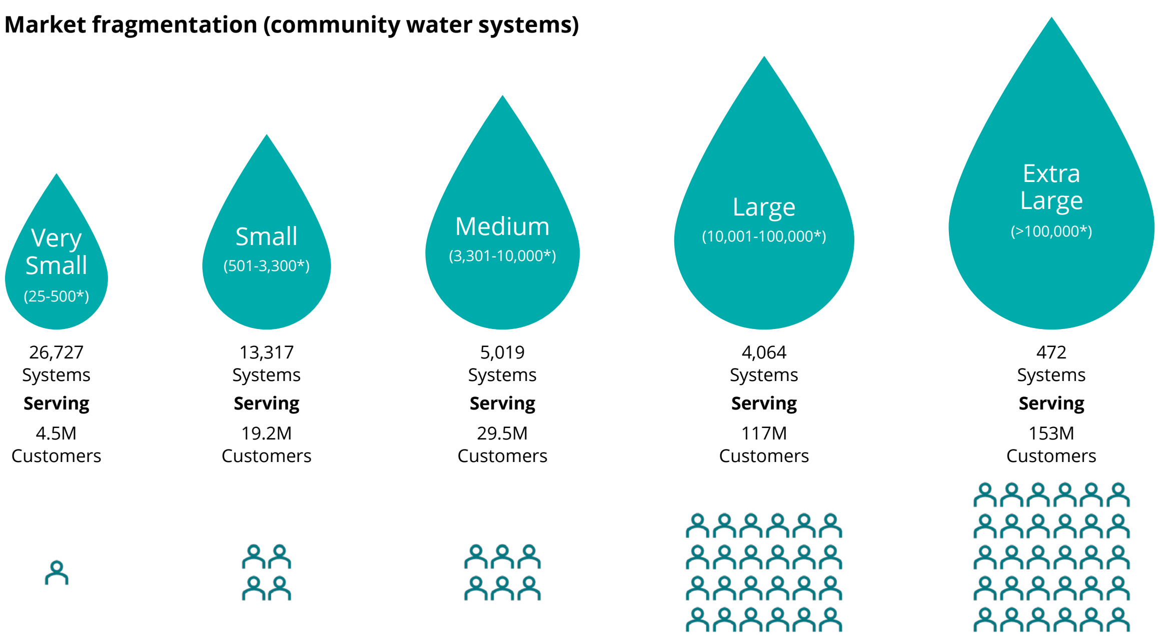
Heightened awareness of customer trust and perception: High-profile water quality failures continue to threaten public trust[19], leaving utilities to navigate growing demands for transparency and equity amid widespread under appreciation of water's value and resistance to rate increases.

Limited operational resources: The US water sector has limited resource availability stemming from challenges such as constrained budgets and regulatory pressures, among others.[26] This is especially prevalent among small systems, and impact coordination, limit modernization, and hinders the adoption of scalable, resilient solutions.

Aging infrastructure under duress: Water systems across the US are operating beyond their intended lifespans and design capacities, leading to widespread water loss, failures, and safety risks that strain utility budgets and threaten service reliability,[27] especially in under-resourced communities.[28]

> "Most of the distribution networks in North America were completed either right after WWII (with a 70-year lifespan) or around 1970 (with a 50-year lifespan) which means all infrastructure is exceeding its service life right now."
>
> **DR. KEVIN LAVEN, DELOITTE[29]**

Market fragmentation (community water systems)



* Range of # of customers per community water system. Source: U.S. EPA.

Case study—Aging infrastructure and resource challenges: East Dunkard Water Authority[30]

The East Dunkard Water Authority (EDWA) faced a severe operational crisis driven in part by its limited resources and deteriorating infrastructure. Chronic underinvestment left the water system's pipes, pumps, and treatment facilities outdated and prone to failures, straining the EDWA's small staff and budget. As breakdowns became more frequent, EDWA struggled to maintain basic water service for the approximately 4,200 area residents, businesses, and schools who relied on the system for clean water, sanitation, and fire protection.

Recognizing these acute risks, the Pennsylvania Public Utility Commission issued an emergency order authorizing Pennsylvania American Water Company (PAWC), a subsidiary of American Water (NYSE: AWK), to take over management of the system. With greater technical expertise and operational capacity, PAWC immediately addressed critical service gaps. This intervention underscores how aging infrastructure and limited resources can quickly compromise service reliability and public health, highlighting the importance of proactive planning, adaptive investment, and resilient operations to ensure the ongoing delivery of safe water to communities.

Constrained revenue: The growing disconnect between rates and service delivery costs is straining utilities' ability to fund critical infrastructure upgrades, leaving many without viable paths to long-term financial sustainability.[31,32]

Emerging technology and cybersecurity risks: While advanced technologies offer transformative potential, low digital maturity and widespread cybersecurity vulnerabilities leave much of the water sector unprepared for modern threats or innovation at scale.

Shifting regulatory landscape: The variability in the regulatory landscape may complicate compliance and increase uncertainty for utilities.

Increasing water supply risk: Disruption from contamination, weather events, competing demands, and infrastructure failure leave utilities vulnerable to disruptions and may limit their ability to maintain reliable and safe service.

To navigate uncertainty effectively, water utilities must begin to rethinkhow they plan.

Case study—Cyber attack on water infrastructure [33]

In the past, cyber groups have targeted US water utilities by exploiting security in control systems. While these attacks, including those in late 2023, have not caused major disruptions, they have exposed vulnerabilities and prompted federal warnings. Experts advise that limited resources and legacy technologies expose the water sector to continued risks, especially since these cyber actors specifically target systems with known Common Vulnerabilities and Exposures (CVEs).

Two critical uncertainties

From a broad set of uncertainties affecting the water sector, two are particularly consequential. These define the axes of our scenario matrix.

1. Water sector structure

Will the sector remain decentralized, or shift toward consolidation and integration?

- **Endpoint 1—Minimal consolidation:**
The sector remains decentralized. Most utilities operate independently under local governance, including municipalities, cooperatives, and small public and private entities. Consolidation does occur, but it is sporadic, small-scale, and often driven by distressed acquisitions or nonprofit-led partnerships with little coordinated oversight or strategic integration.
- **Endpoint 2—Widespread consolidation:**
The water sector becomes significantly more consolidated. This may occur through publicly coordinated regional governance models, or via private-sector acquisition and holding strategies. In some regions, state or the federal government lead structured integration efforts; in others, investor-owned utilities consolidate smaller systems.

2. Customer engagement and water use behavior

How aware, engaged, and influential will customers be in shaping utility strategies?

- **Endpoint 3—Low customer engagement:**
Environmental stress is present but less visible, and messaging from federal, state, and local entities is inconsistent. Customers prioritize water bill stability and service reliability over other issues such as conservation and investment.
- **Endpoint 4—High customer engagement:**
The frequency and severity of water-related events continue to increase, and public institutions, including governments, utilities, and non-governmental organizations (NGOs), deliver consistent and compelling messages about the urgency of water resilience. Customers are informed, vocal, and active about decisions made by water leaders. They demand more transparency and better and broader services (e.g., responsive real-time communication, resilience investments in diversified sources, infrastructure upgrades, more transparent service fee calculations, and water reclamation).

These two axes will likely define a matrix for our four distinct potential scenarios for the US water sector by 2040.

Future scenarios: Four theoretical paths for the US water sector in 2040

The interaction between these two key uncertainties, **water sector structure** and **customer engagement and water use behavior**, creates a 2x2 matrix, which gives rise to four distinct scenarios:

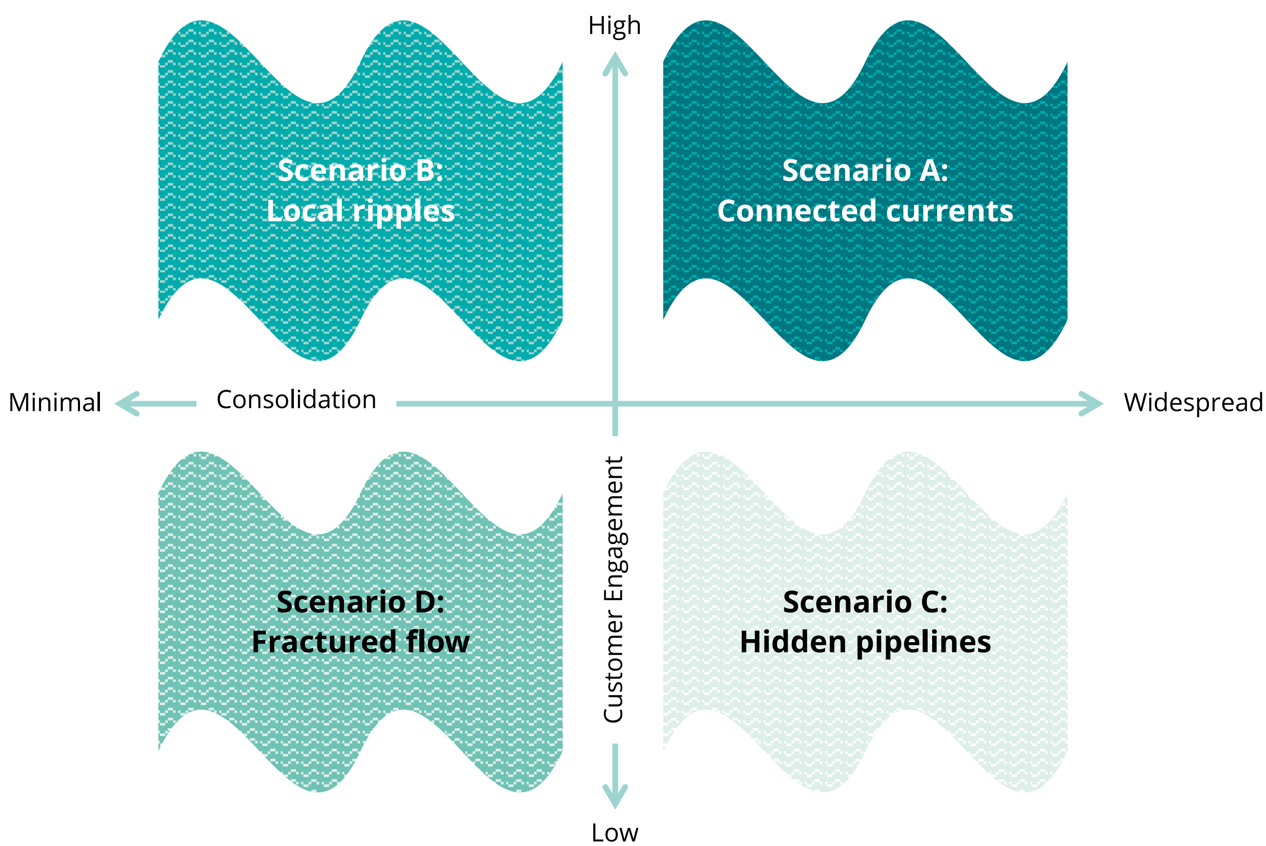
A. **Connected currents** (Widespread consolidation + High customer engagement)

B. **Local ripples** (Minimal consolidation + High customer engagement)

C. **Hidden pipelines** (Widespread consolidated + Low customer engagement)

D. **Fractured flow** (Minimal consolidation + Low customer engagement)

Each scenario includes a narrative that describes the environment in which service providers, customers and regulators may operate. A set of indicators, or scenario signals were identified, that suggest how likely a given scenario is to unfold.



Scenario A: Connected currents

Widespread consolidation + High customer engagement

Galvanized by extreme weather events and public demand, the US water sector undergoes a decade of sweeping reform and investment, resulting in consolidated regional entities, advanced infrastructure, and empowered communities. By 2040, trust, reliability, and innovation define a resilient water future shaped by bold governance and deep public engagement.

Water quality crises, stemming from a series of extreme weather events and PFAS contamination incidents have mobilized unified federal and state intervention. Public engagement reaches historic highs as community voices demand solutions for water systems issues. By 2040, policymakers have responded to increasingly unified public pressure by enacting sweeping water resilience legislation that catalyzes a decade of unprecedented investment and governance reform.

This leads to a highly consolidated market through a mix of public-sector initiatives, mergers, and innovative public-private partnerships. New regional water entities emerge, encompassing multiple jurisdictions and equipped with the scale to manage capital-intensive projects and deliver coordinated service.

With robust funding and investment opportunities e.g., customer approved rate increases, consistent government allocations, and access to diverse financing channels, water utilities focus on infrastructure upgrades, technological modernization, and advanced customer engagement capabilities.

Utilities adopt innovative solutions such as AI, IoT sensors, smart meters, robotics, and digital twins. Coupled with investment in developing an agile, technically astute workforce brings true advancement to the sector.

Autonomous system operations, predictive maintenance, and asset management are scaled to drive optimal infrastructure management with focus on customer affordability.

Not only are water availability and safety concerns mitigated, but interactive portals allow customers to monitor usage in real-time, manage reuse technologies (e.g., rainwater harvesting and water

reclamation), and receive automated sustainability notifications and recommendations. Water affordability and access is prioritized, ensuring vulnerable communities receive resilient infrastructure and adaptive pricing. A circular water economy is adopted nationwide driving reuse, recovery, and resilience.

In this future, trust and capability will reinforce each other. Customers are invested. Institutions are empowered. And the sector is resilient, responsive, and fair.

Leading indicators:

- Increased public-private partnerships and regional utility mergers
- In-depth coverage of weather events and water system disruption across national and local news outlets and social media
- Increased demand for tech-enabled talent
- Increased bipartisan alignment and regional partnerships for water system resilience

Scenario B: Local ripples

Minimal consolidation + High customer engagement

Driven by community-level resources and action, the water sector evolves unevenly. The future is defined by local breakthroughs but regional fragmentation. While some communities surge ahead with advanced systems, others risk falling further behind. Without proactive efforts, water inequality has the potential to proliferate.

In this future, local and regional actors, such as municipalities, public utilities, investors, and non-profits, drive service provision. Public engagement is strong, fueled by widespread water stress and natural resource awareness.

While some areas thrive, others fall behind, shaped by a complex interplay of geography, economics, institutional capacity, policy and regulatory environment, and public needs. Regions with wealthier income bases, stronger governance, and access to advanced infrastructure adapt more readily, often accelerating local solutions enabling utilities to capture substantial investment for large scale capital investment. Meanwhile, communities with fewer resources, poorer water quality, or with less direct exposure to the immediate effects of constrained water availability struggle to meet growing demands.

Fault lines are defined by the alignment (or misalignment) between local needs, institutional readiness, regulatory and policy constraints, and available resources. This uneven terrain leads to a patchwork of water outcomes, some innovative and resilient, others strained and reactive. Philanthropic support, cooperative arrangements, and municipal bonds help in places, but progress remains piecemeal.

Customer engagement is high, but the results vary. Some communities co-design stormwater gardens and vote on reuse projects and innovative solutions; others struggle with public misinformation, limited institutional capacity, and antiquated solutions. Regulatory frameworks diverge across jurisdictions creating a patchwork and lack of consistency across state and community boundaries that increases access and health outcomes.
.

This scenario is characterized by passionate communities that drive innovation, but fragmentation prevents universal access to resilient service.

Leading indicators:

- Rise in philanthropic or NGO-led utility partnerships and locally led pilots
- Regulatory divergence across states with differing enforcement and investment mandates
- Strong civic media narratives around local water involvement and innovation
- Decreased costs for critical system components
- Increased technology adoption rates

Scenario C: Hidden pipelines

Widespread consolidation + Low customer engagement

Acquisition by private sector entities becomes the dominant form of consolidation. Innovation flourishes as investors work to increase efficiency and boost returns, however the public remains uncertain. Without taking the proper steps to increase transparency, water managers run the risk of further disconnect between water services and the people they serve.

By 2040, private actors have moved to consolidate the sector as public utility funding and financing channels have decayed. Large investor-owned companies and infrastructure funds acquire hundreds of systems, forming centralized platforms that operate geographically. Although the need for resilience and safety continue to drive innovation, in some cases innovative efforts focus on operational efficiency and backend optimization to reduce costs and maximize profits.

Public engagement with water issues diminishes further as economic pressures demand attention. Water long undervalued slips further down the list of consumer priorities, which now focus more on everyday goods and energy security. Many customers are only marginally aware that their local system is now run by a major corporate entity, and those who are, tend to feel more like passive service recipients than active stakeholders. This disengagement, together with mounting skepticism, limits customers' influence over the direction of their utilities and poses risks for the sector's long-term needs and connection to the communities it serves.

Centralized field operations and workforce automation increase reliability while cutting costs. However, rate increases are still required to close funding gaps, despite customer frustration. Regulatory oversight exists but largely supports financial stability over ecological concerns.

Large-scale investments in infrastructure modernization, digital systems, and water reuse proceed rapidly, often driven by centralized decision-making and financial imperatives rather than public consensus. While consolidation enables capital deployment and workforce specialization, limited customer engagement and education deepen skepticism particularly as the costs of resilience investments are reflected in higher rates.

In this future, the sector is technically proficient but socially brittle, optimized for reliability and investor confidence, but lacking in transparency, equity, and trust of local or less stable utilities.

Leading indicators:

- Accelerating consolidation and M&A activity, especially acquisitions of small or distressed systems by private or investor-owned firms
- Growing disparities in utility performance and customer rates, reflecting uneven management capacity and investment levels
- Lower customer participation in public processes and decreasing customer satisfaction
- Heightened affordability pressures due to inflation, reduced household buying power, and rising operational costs

Scenario D: Fractured flow

Minimal consolidation + Low customer engagement

Fragmented, underfunded, and increasingly inefficient, the water sector is in systemic decline. Contradictory signals from all levels of government leave the public confused, distrustful and disengaged. With basic service at risk, water managers must prioritize stabilization before innovation is even possible.

By 2040, the sector is marked by breakdowns, both literal and institutional. Water infrastructure across large swaths of the country has significantly exceeded its planned lifespan, remains underfunded, and succumbs to frequent failures. Political dysfunction and misinformation hinder reform. Public support for investment remains minimal, despite worsening conditions. Customers demand reliable service but deal with constant service disruptions and boil water advisories. They resist the rate hikes or behavioral changes needed to stabilize safe water availability.

Utilities continue to operate independently, many at the edge of insolvency. Small systems suffer chronic failures: boil advisories, contamination events, and litigation become routine. There is little regulatory enforcement, and resilience planning is virtually nonexistent outside of islands of active engagement characterized by local policy in response to market drivers and weather events.

Without coordinated policy or capital access, can stall innovation. Digital adoption is sparse; many systems still rely on manual operations and analog tools. The workforce is aging and shrinking. Cyber security incidents are frequent, and emergency responses dominate utility agendas and expenditures.

This is the future of drift where no actor holds sufficient will, capacity, or trust to transform the system. The result is widening disparity, institutional decay, and public discouragement.

Leading indicators:

- Increase in poor financial performance and default rates on municipal utility bonds or delayed rate adjustments
- Decline in utility workforce numbers, especially in rural or isolated systems
- Increase in water-related emergencies with significant increase in health-based violations (e.g., boil water advisories, contamination incidents, and emergency declarations)

Smart Bets: Building resilience no matter the future

While each scenario offers a distinct vision for how the US water sector may evolve, the degree of uncertainty underscores the urgency of acting now. Not every strategy can, or should, be implemented today, as some depend on longer-term shifts in governance, markets, or evolving public sentiment. But others are foundational and essential: "smart bets" moves that strengthen institutional resilience, enhance agility, and build in contingency across a range of futures. These actions can be embedded into planning today, helping organizations prepare not just for one version of the future, but for many.

Equally important, smart bet moves serve as a unifying force across the organization. Because they are actionable today, they advance buy-in, energize teams, and help build a shared sense of direction. This early momentum not only accelerates adoption but also lays the groundwork for embracing more complex initiatives in the future, solving the fracture between short-term decisions and long-term planning that so often plagues organizations.

The table below provides examples of "smart bets" moves that service providers can consider taking today. We provide illustrative considerations across six key business functions.

Customer

1. Implement AI-driven personalized customer outreach
2. Establish continuous adaptive customer feedback loops
3. Deploy next generation digital customer portals
4. Build partnerships that directly tie to community needs

Workforce

1. Institutionalize sector-wide talent pipelines
2. Build cross-training and upskilling programs
3. Create enterprise-wide knowledge transfer processes
4. Standardize dynamic workforce agility

Technology & innovation

1. Conduct digital maturity assessments
2. Scale automation, analytics, and AI to enterprise level
3. Create innovation alliances
4. Pool R&D investment via utility innovation consortiums

Operations & resilience

1. Embed long-term resilience scenarios into capital planning
2. Develop real-time crisis management centers
3. Deploy integrated predictive maintenance, asset management, and scenario simulation
4. Anchor local supply chain security partners

Finance & funding

1. Optimize cost sharing and shared services
2. Pilot adaptive pricing models
3. Establish partnerships with financing entities linked to resilience
4. Drive cost optimization/customer affordability initiatives

Governance & policy

1. Clarify governance models for cross agency or sector partnerships
2. Benchmark performance against leading cross-sector peers
3. Leverage AI to comply with regulatory changes
4. Engage in proactive lobbying for future investments

These actions are not bound by a single future. Rather, they are structural enablers that can help to build utility resilience across all four scenarios. Whether navigating toward regional reinvestment or contending with decentralized drift, smart bet moves help enable water systems to be smarter, fairer, and more prepared for the challenges ahead.

Conclusion: Moving forward

The US water sector is entering what may prove to be a defining decade. Between extreme weather events, emerging contaminants, capital strain, and rising public expectations, utilities are navigating a more complex operating environment than ever before. Unpredictable weather events like winter storms and hurricanes combined with PFAS-driven litigation, and record-breaking droughts in the Southwest are no longer idiosyncratic anomalies but rather likely signals of a system under increasing stress.

In this context, long-term thinking is important. Scenario planning can provide utilities with strategic range to imagine what is next, identify blind spots, and chart a course that builds resilience across multiple futures. These scenarios are neither predictions nor prescriptions. They are identifiers used to reconsider assumptions, provoke conversation, and guide investment in capabilities that will matter regardless of how the future unfolds. They seek to build confidence in short- and long-term strategic decisions.

Across these future scenarios, affordability is expected to remain a defining constraint. The scale of investment required to modernize and build resilient water systems hinges on transparent decision-making and proactive engagement with customers and communities.

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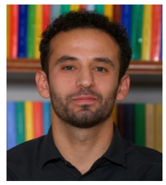

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