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Opening the Tap

OPPORTUNITIES IN REGULATED WATER UTILITIES

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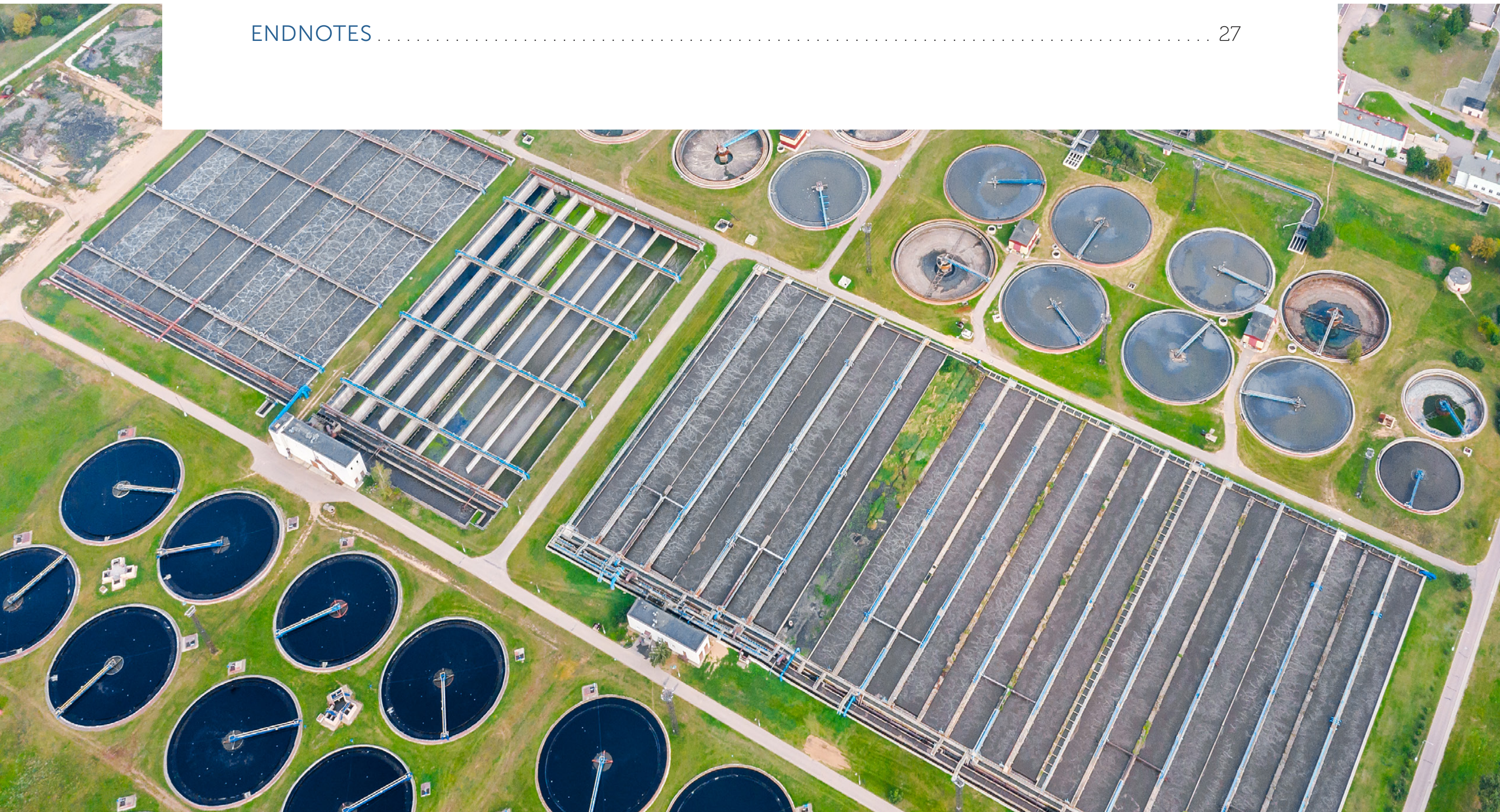


EXECUTIVE SUMMARY

America's water infrastructure is in decline. After decades of underinvestment, U.S. water infrastructure is rated D to D+ and over the next 20 years needs up to $1.27 trillion[1,2] for repairs and expected growth. However, the extreme fragmentation of water utilities—there are over 55,000—makes it difficult for many thousands of smaller systems to shoulder such costly repairs. Collectively, American water utilities maintain over 2.2 million miles of water and sewer pipes[3] and distribute over 40 billion gallons of fresh water each day.[4,5] Their deterioration has a cost in economic, environmental, and social terms.

- On average, 25%[6] of drinking water in America is lost to leakage, wasting the money, energy, and chemicals used to sanitize it.
- At least 3–10 billion gallons of untreated sewage[7] are released into the environment each year. An additional 850 billion gallons of stormwater are released with an unknown but significant volume of sewage contaminants.
- About 7–8% of U.S. water systems fail federal water quality standards and are concentrated in low-income and rural areas.[7] The crisis in Flint, Michigan, highlighted the vulnerability of low-income communities.

Despite the urgent need for capital, government capital expenditures on water infrastructure have fallen roughly 20% over the past decade and President Joe Biden's infrastructure proposal provides only about 10% of what's needed.[8] With no existing or proposed mechanism for collecting maintenance reserves, it is estimated that pipes put in service today will remain in use for 125–225 years,[9,10] despite having a typical useful life of only 80. There is a desperate need for fresh capital beyond what the government can provide.

However, a solution may be coming into view. The convergence of several factors makes private investment more attractive and better aligns stakeholders across the industry:

- Within the past five-to-10 years, regulatory friction has eased with greater recognition of the need to attract private capital.
- The Biden infrastructure proposal reduces borrowing costs and credit risk for private capital.
- Public attitudes towards drinking water are changing. The Flint, Michigan, water crisis put water safety in the public spotlight, and surveys indicate that customers now place a higher value on essential water services because of the COVID pandemic.
- Investor demand for infrastructure investments has risen dramatically over the past five years.
- Opportunities to aggregate small water utilities creates enough scale to deliver returns that can attract private capital.

1. $1 trillion for drinking water utilities, $271 billion for wastewater utilities.
2. $472 billion for drinking water utilities; wastewater utilities not assessed.

Although investors have historically focused on privatizing public water systems, there are also opportunities to consolidate private systems, of which there are ~20,000. This approach still carries risk but sidesteps many of the issues that make public privatizations a lengthy and volatile process. Water utilities earn a stable, regulated return that averages 9.5% nationally[11] and remains largely insulated from economic cycles. Others have achieved 12–15% equity returns by pursuing a consolidation strategy with modest leverage. Capital investments that tangibly improve water quality and reduce sewage overflow also fit squarely into strategies that integrate Environmental, Social, and Governance factors.

FIGURE 1: Fragmented and Aging

U.S. Water Infrastructure				
	# Utilities	# Systems	Miles of Pipe	20-year Capex Needed
Drinking Water	40,000	50,000	1,000,000[15]	$476bn2–1tn[1]
Wastewater	16,000	34,000	1,000,000[16]	$271bn[1]

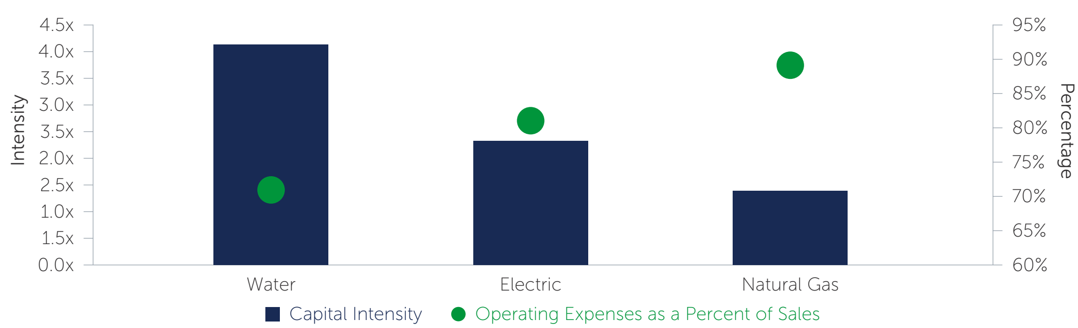
Drinking Water Data	
U.S. Drinking Water Lost to Leaks	25%[7]
Annual Water Main Breaks	240,000[8]
Current Rate of Replacement[12]	125–225 years[13,14]
Average Expected Life	80[6]

SECTION 1. PRIMER TO A BROKEN INDUSTRY

Overview

Water utilities typically operate one or more closed systems, which either clean and distribute drinking water or collect and sanitize wastewater. Both require similar infrastructure: a treatment facility, underground pipes, and often, for drinking water utilities, intangible water rights. This infrastructure is capital-intensive, significantly more so than other regulated utilities like electricity or natural gas, though ongoing operating expenses are lower. Like other regulated utilities, water utilities receive the exclusive right to service a given area in exchange for providing safe and reliable water or wastewater services at a regulated price.

FIGURE 2: Capital Intensity and O&M Expenses by Utility Sub-Sector



SOURCE: FactSet, Company reports, RBC Capital Markets.

12. At the current replacement rate, pipes installed today will be in place for 125 years. Their expected life is half that.

There are roughly 55,000 water utilities that operate over 80,000 water systems in the United States,[18] the bulk of which are drinking water systems. The largest 10% of drinking water systems serve roughly 80% of the population and are owned predominantly by large municipalities, creating a perception that there is little private participation in the industry. However, about 40% of drinking water utilities are privately owned, serving 15% of the U.S. population.

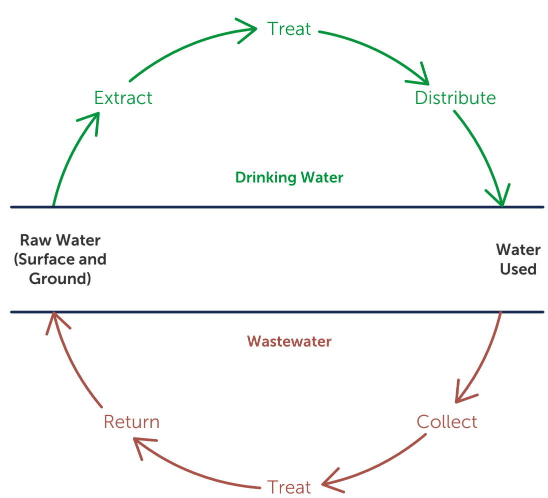
Historically, U.S. water infrastructure development was not centrally planned, leaving water utilities to develop incrementally as new towns and suburban areas were established.

Given the high cost to transport water and the pervasive availability of water in many parts of the U.S., developers often found it less expensive to build a small, new water system rather than connect to the closest existing utility; this resulted in a large number of fragmented, very small, private water utilities.

DRINKING WATER LIFE CYCLE

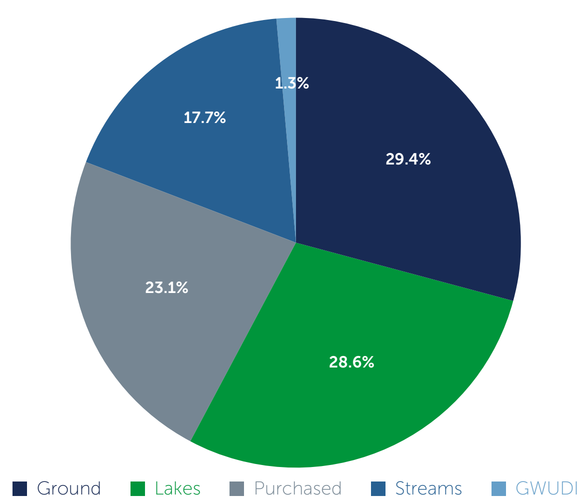
The drinking water life cycle for residential and commercial customers begins with raw water. While water rights markets are often complex and opaque (see our February 2020 paper, **How To Invest in Water So We Don't Run Out**) most water utilities own water extraction rights and, therefore, do not purchase water on the open market. **(FIGURE 4)**

FIGURE 3: Drinking Water Life Cycle



SOURCE: U.S. EPA, 2005.

FIGURE 4: Percentage of Water from Each Source



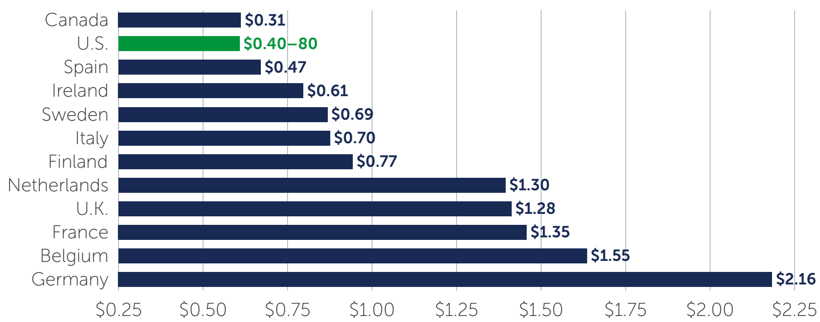
SOURCE: U.S. EPA, 2005.

Raw Water—Unique, Scarce and Inexpensive

Fresh water comprises only 2.5% of the earth's total water supply, and two-thirds of it is frozen, with the vast majority of the remaining one-third underground.[19] Fresh water has no substitute, and the current rate of consumption outpaces supply.

Despite this, water remains inexpensive, particularly in the U.S., where the cost per gallon is half of what European counterparts pay, despite Americans consuming nearly twice as much per capita. A gallon of water delivered to a tap in the U.S. costs just $0.004, about 300 times less than a gallon at the supermarket.

FIGURE 5: Typical Municipal Water Prices (Per Cubic Meter)

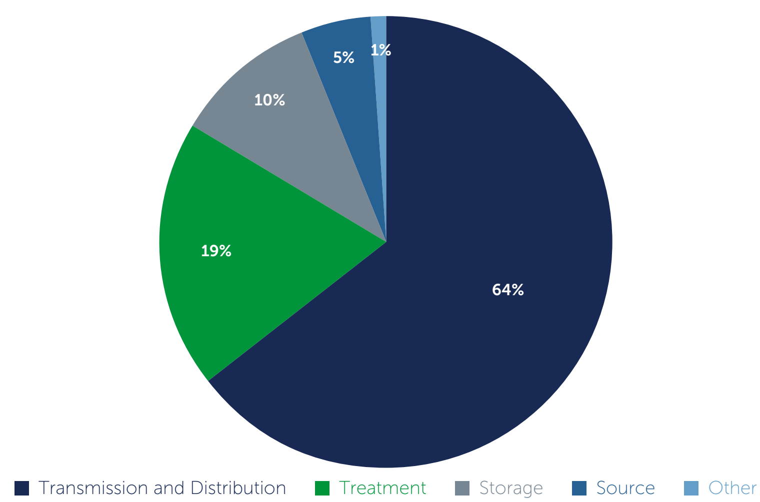


SOURCE: Environment Canada, 2021.

Drinking Water Utilities

Drinking water utilities extract raw water, sanitize it to federal drinking water standards, and distribute it to homes and businesses through a network of pipes. Municipal-owned utilities generally provide water at cost, whereas privately owned utilities, known as investor-owned utilities, provide water at a predetermined profit margin set by their regulator. Despite having a reliable profit margin, private systems are often able to provide water at lower costs due to a combination of financial incentives to reduce expenses, and municipal mismanagement, which was on prominent display during the crisis in Flint, Michigan.

FIGURE 6: Breakdown of Capital Expenditure Requirements for U.S. Drinking Water Systems (2011–30)



SOURCE: EY, 2018.

Operations include:

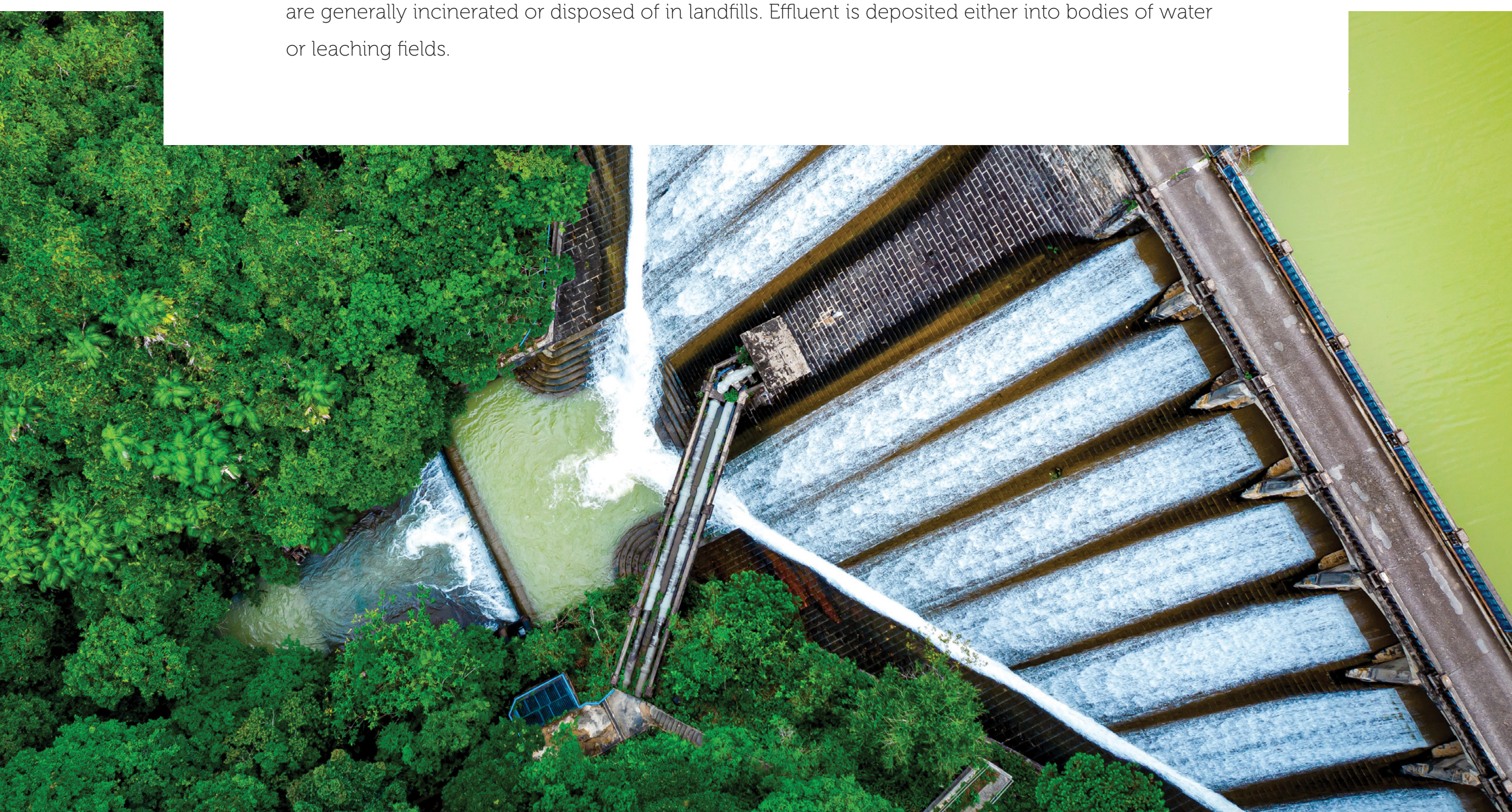
- *Extraction:* While water utility providers typically own the rights to extract raw water, in some cases water must be acquired from private owners, particularly in arid regions.
- *Treatment:* Treatment facilities remove biological and chemical pollutants through a combination of chemical and physical processes to meet federal contaminant targets.
- *Distribution:* Treated water moves through a system of distribution pipes and storage facilities, which consumes the majority (64%) of invested capital and repair expenses.[20] Given the seasonal nature of water demand, which increases during warmer summer months, storage assets are essential. U.S. water quality can vary depending on local regulations and the quality of distribution infrastructure.
- *Testing:* Utilities regularly ensure water within their distribution systems meets federal regulations. Active management of testing programs is critical.

Wastewater Utilities (Sewer)

Wastewater utilities function similarly to their drinking water counterparts—but in reverse. Importantly, there is generally less public and political opposition to privatization of wastewater utilities, as the end product is not directly consumed. Wastewater systems deploy similar assets as drinking water systems and are equally capital intensive, though, on average, they tend to service a greater number of customers. Importantly, both types of water utilities share the same regulator.

Operations include:

- *Collection:* A network of sewer pipes, stormwater drains, and lift stations transport wastewater to a central treatment center.
- *Treatment:* Physical, biological, and chemical treatments produce effluent (liquids) and biosolids (sludge) that must be disposed of.
- *Disposal:* Biosolids that meet certain standards can be sold as fertilizer, and remaining biosolids are generally incinerated or disposed of in landfills. Effluent is deposited either into bodies of water or leaching fields.



INDUSTRY LANDSCAPE

The best way to describe America's water utilities is that they are extremely fragmented, burdened by deteriorating infrastructure, and short of investment capital to fix water quality and sewage overflow problems. These operators are increasingly desperate for fresh capital.

Fragmentation

America's fragmentation is not unique; many other developed countries with similar geological, political, and economic conditions developed in the same manner; Germany's water utility industry, for example, is also highly fragmented. However, several developed countries have consolidated water system operations, most notably the U.K. and France. The U.K. nationalized its water systems in the early 1900s and consolidated them into 10 regional operating authorities in 1974; privatization returned in 1989 due to a lack of funding. In France, some 30,000 water systems are government owned, though nearly all have contracted management to a handful of private operators to reduce debt and gain operating efficiencies. In both the U.K. and France, thousands of separate water systems continue to operate within each utility.

Few, if any, countries have consolidated their water system infrastructure. Notable exceptions are the Gulf States, which developed later and rely disproportionately on large desalinization plants to provide fresh water.

FIGURE 7: Community Water Systems

System Size (Population Served)	# of CWSs	Population Served (Millions)	% of CWSs	% of U.S. Population Served by CWSs
Very Small (25–500)	28,462	4.8	55%	2%
Small (501–3,300)	13,737	19.7	27%	7%
Medium (3,301–10,000)	4,936	28.7	10%	10%
Large (10,001–100,000)	3,802	108.0	7%	36%
Very Large (>100,000)	419	137.3	1%	46%
Total	**51,356**	**299.2**	**100%**	**100%**

SOURCE: U.S. EPA, 2013.

Underinvestment

Underinvestment in water infrastructure is staggering and the result of a combination of the industry's enormous capital intensity, extreme fragmentation, stretched municipal budgets, and, historically, public indifference due to its "out of sight" nature. Estimates of capital needed over the next 20 years to upgrade dilapidated water infrastructure range from $750 billion to $1.27 trillion.[21,22] At the time of publication, the proposed Biden infrastructure plan would only provide roughly $111 billion, around 10% of what's needed.

Unsurprisingly, industry stakeholders see infrastructure replacement and securing associated funding as the industry's top two issues (table below), even surpassing fears of long-term water shortages.[23]

Small utilities are generally the most in need of upgrades. For example, water mains owned by small utilities break at twice the rate as those at large utilities.[24] This drives Environmental Protection Agency (EPA) estimates that small utilities need to spend 2.6-times more per customer than large utilities to make necessary repairs **(FIGURE 8)**.[25]

FIGURE 8: CapEx Requirements by System Size

Size	# Users	CapEx Need per Customer
Very Large	100,000+	$1,231
Medium	3,301–100,000	$1,511
Small	1–3,300	$3,179

SOURCE: U.S. EPA, 2018

Typically, municipal owners have not reserved sufficient capital to make upgrades and therefore must raise taxes, raise water prices, or cut other programs to fund upgrades, none of which are politically palatable. Competing priorities led to a 22% decrease in government capital spending on water and wastewater infrastructure from 2009 to 2014[26] as officials deferred maintenance to pursue more popular policy goals. However, as municipal budgets have shrunk and federal funding has dried up, tapping private capital looks increasingly attractive. The reduction of state and municipal revenues since the COVID crisis has only made this worse.

For small, private utilities, consolidation can ease fundraising needs by creating larger pools of users over which to spread fixed costs, though not all states allow such pooling.

Ownership Classes

There are three types of ownership for water utilities:

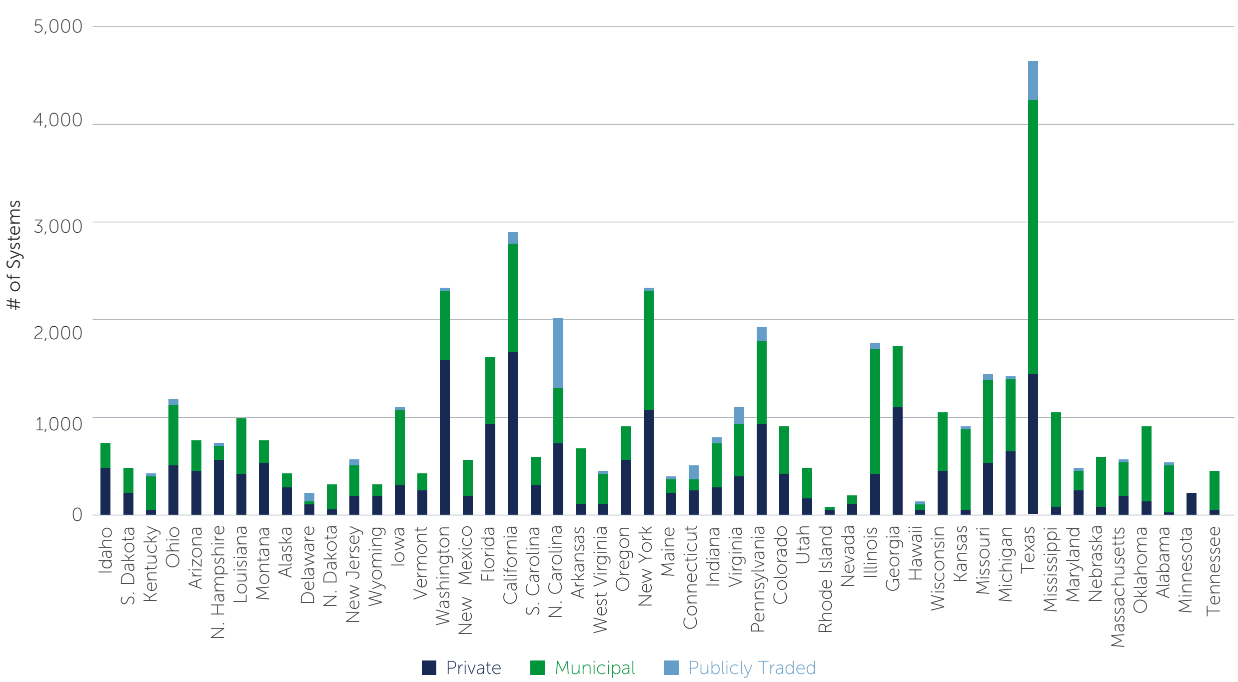
- *Municipal-Owned Utilities:* Owned by state or local governments and are not subject to price regulation but are typically managed to keep water prices low.
- *Public Investor-Owned Utilities:* Large, publicly traded companies that enjoy very low cost of capital and bid aggressively for acquisitions within their existing footprints.
- *Private Investor-Owned Utilities:* Generally smaller than the municipal counterparts and are owned by private investors. Their location generally correlates to population density. **(FIGURE 9)**

FIGURE 9: Drinking Water Systems

	# of Systems	% of Systems	# of Service Connections	% of Service Connections
Private	20,473	42.3%	6,938,026	7.0%
Government	25,930	53.6%	86,643,054	87.5%
Publicly Traded	1,979	4.1%	5,383,809	5.4%
Grand Total	**48,382**	**100%**	**98,964,889**	**100%**

SOURCE: Barings, based on U.S. EPA data, 2021.

FIGURE 10: Drinking Water System Distribution



SOURCE: Barings calculations, based on U.S. Environmental Protection Agency SDWIS data, 2021.

REGULATORY STRUCTURE

Water utilities are regulated by federal drinking water and wastewater discharge standards, which are enforced at the state level. Investor-owned utilities are subject to further state regulation by public utility commissions, limiting the prices they can charge for goods and services.[27] Differences in price-setting practices across states have led to wide variations in the rate-setting process and return to investors. State utility regulators do not merely enforce regulations but must balance the interests of utility shareholders and their customers, or "ratepayers."

Federal Law and the EPA

There are two principal federal laws relevant to water utilities:

- *Safe Drinking Water Act of 1974:* authorizes the EPA to create and enforce water quality standards. Through this law, the EPA sets acceptable levels for 90 contaminants and satisfactory treatment techniques. The agency may fine utilities that fail to meet standards, but, in practice, corrective action may never occur if fixes are too costly. This is especially true for municipal-owned utilities where there is no single "owner" to pursue.
- *Clean Water Act of 1972:* authorizes the EPA to broadly regulate water pollution, which extends to discharge from wastewater treatment plants. It is the principal regulatory framework for the wastewater treatment industry.

State Regulators

States are required to enact legislation to ensure compliance with federal and EPA standards, and each state has laws controlling water utility pricing within their jurisdictions, guided by the "Bluefield"[28] and "Hope"[29] Supreme Court decisions. States may also choose to set water quality standards that are more rigorous than federal standards.

Rate-Setting Process

Municipal-owned utilities typically pass along costs to water users without a markup. For investor-owned utilities, rate setting starts with a target equity return set by the regulator, which is then used to back into the price level needed to produce that target return. This approach is similar to other utility industries.

A Return on What?

Equity investors earn a return on a utility's "rate base," which is the book value of infrastructure plus working capital plus other state-by-state items. Implicit in this approach is the assumption that the value of a utility is, essentially, the value of its assets.[30] Therefore, the rate base calculation is of critical importance. It will shrink over time through depreciation and grow with new capital expenditures, thereby generating a return on new capital. The rate base may be the same or less than the acquisition price, but is usually not more; and it can be $0.

How Much Return?

Regulators set equity investor returns as a percentage of the rate base. That percentage is calculated as a weighted average cost of capital (WACC) based on a hypothetical target capital structure, usually 50% equity, 50% debt. The cost of debt used in the WACC is the actual weighted average coupon of the existing debt at the utility. The cost of equity used in the WACC is determined by the regulator and averages 9%. Rate Base x WACC = the allowed return to investors. Allowed return less interest expense = equity investor return.

27. This limit is further clarified in two Supreme Court cases, which establish that regulators must allow prices to be high enough to ensure utilities are able to: 1. raise sufficient capital to discharge their public duties; and 2. earn a return on investment commensurate with the risks taken to do so.
30. This equivalence is flawed for highly depreciated systems and is addressed by FMV legislation discussed later in this paper.

Operating expenses, including non-cash depreciation, are then added to the allowed return to arrive at the required amount of revenue needed at the utility, known as "required revenue." Required revenue is then divided by consumption estimates to arrive at a per-gallon water price.

The process of setting water rates is known as a "rate case," and the burden is on the utility to submit such a case whenever an increase in water prices is needed.

Some utilities are allowed to earn a portion of their required revenue through fixed monthly charges, thereby reducing reliance on volumetric revenues. Fixed charges tend to be proportionate to a utility's fixed expenses. Typically, volumetric revenues exceed fixed revenues resulting in significant financial exposure to declining water consumption.

Key Expenses

Key operating expenses are relatively straightforward and include the cost of raw water, chemicals, energy, routine maintenance, and testing. Utilities are incentivized to reduce expenses, as those savings are retained by the utility, at least until the next rate case, when they become part of required revenue. Correspondingly, if a utility experiences expense overruns, it typically cannot recapture these through higher rates until a new rate case is approved.

Capital Structure and Government Support

Typically, private utilities are funded through a mix of equity and debt, often 50/50. As an indication of urgency around access to capital at small systems, the U.S. government has established several programs to provide below-market loans to utilities, but these programs have been chronically underfunded. At the time of publication, President Biden's proposed infrastructure plan is poised to change that with over $100 billion in capital, roughly half of which will replenish these programs. It is still unclear what form this new capital would take, what requirements would need to be met to access it, and whether the proposal will become law (and in what final form).

- *State Revolving Loan Fund:* Grants from the EPA are leveraged in bond markets, the proceeds of which are directed to states, which lend them out in the form of low-interest, 20-year loans.
- *U. S. Department of Agriculture Rural Development Loans:* Low-interest loans available to assist systems serving rural populations under 10,000.
- *Public Activity Bonds:* Municipal bonds issued for the benefit of privately owned utilities. The federal government sets the loan volume cap for each state.
- *Water Infrastructure Finance and Innovation Act:* Established in 2014 to help water and wastewater systems finance large-scale projects costing more than $20 million.

BUSINESS MODEL

Water utilities operate as regulated monopolies that sell a product for which there are no alternatives, little price elasticity, and little correlation to the economic cycle.

Water Elasticity

- *Income Elasticity:* The U.S. Department of the Interior estimates that for every 10% reduction in income, water demand falls only 0.8%, though as incomes fall dramatically, water-price sensitivity increases.
- *Price Elasticity:* Household price elasticity for municipal water has been studied for decades and centers on -0.40[31] in the long term, and even less for periods under one year. In other words, if water prices rise by 10% for longer than one year, demand would only fall 4%. For price increases lasting less than one year, elasticity is closer to -0.25.[32]

Of course, price elasticity varies. Water for human consumption has almost no price elasticity, but water used for pools and irrigation systems has above-average elasticity. During droughts, water price elasticity falls even further.

Correlation to Economy

As a result, water utilities have a low correlation to the economic cycle, making them attractive sources of investment diversification. Economic recessions have almost no impact on household demand elasticity for water.[33]

In the last two U.S. recessions, water utility revenues and margins were resilient, though their equity prices did show some short-term sensitivity.

In the dotcom recession, equity prices were essentially unchanged, but during the Global Financial Crisis recession, equity prices displayed a 0.7-times beta to the S&P 500. The 2020 COVID crisis is still unfolding at publication, but that beta has been roughly 0.25–0.4 thus far, though water utilities entered the COVID crisis with near-record valuations.

FIGURE 11: Fundamentals

		Date	LTM Revenue	LTM EBITDA Margin
GFC	Peak	3Q 2007	1,087	42%
GFC	Trough	1Q 2009	1,191	41%
GFC	Trough + 1 yrs	1Q 2010	1,259	43%
Dotcom	Peak	1Q 2000	559	42%
Dotcom	Trough	3Q 2002	666	44%
Dotcom	Trough + 1 yrs	3Q 2003	700	44%

SOURCE: Barings calculations, based on Bloomberg data, 2021.

FIGURE 12: Equity Pricing

		Date	S&P	Water Util Average
GFC	Peak	10/9/2007	1,565	26.2
GFC	Trough	3/9/2009	677	15.9
GFC	***Change***		***-57%***	***-39%***
GFC	Beta to S&P			0.7x
Dotcom	Peak	3/24/2000	1,527	11.9
Dotcom	Trough	10/9/2002	777	11.7
Dotcom	***Change***		***-49%***	***-1%***
Dotcom	Beta to S&P			0.0x

SOURCE: Barings calculations, based on Bloomberg data, 2021.

ENVIRONMENTAL, SOCIAL & GOVERNANCE

The social benefit of clean drinking water is clear. Innovations in drinking water and wastewater sanitation have done more to improve human health than any other modern innovation. In the United States, such improvements reduced infant and child mortality rates by 62% and 81%, respectively, in urban settings in the early 20th century,[34] an impact likely many orders of magnitude greater than the discovery of antibiotics.[35]

However, these innovations can't protect consumers when infrastructure fails. Across the United States, there are on average 7,000 boil water notices issued at any given time by water utilities, which indicate tap water is unsafe for human consumption. Half of these boil notices result from water main breaks.[36]

Similar failures in sewer systems are responsible for the release of at least 3–10 billion gallons of untreated sewage[37] into the environment each year. And, incredibly, properly functioning sewage systems discharge sewage into the environment whenever they are overwhelmed by stormwater because sewage and stormwater share the same pipes. With rain events increasing due to climate change, these discharges are becoming more frequent and already total 850 billion gallons of contaminated stormwater annually. Fixing this was a priority for the Obama administration, but the sheer cost was too much for many municipalities, and upgrades are behind schedule, if they are scheduled at all.

In summary, failing infrastructure has a financial, human, and environmental cost. Improving it should be considered ESG-positive.

SECTION 2. CHANGES AFOOT

Amid this picture of a failing industry, however, there are important changes afoot, including trends to reduce regulatory friction, rising pricing, and increased pressure to tap private capital amid government budget cuts. There are further pressures from rising public interest in water quality sparked by the Flint, Michigan, crisis.

REGULATORY TRENDS

Increasingly, state legislatures are recognizing the need for water infrastructure improvements and are creating incentives to attract the necessary capital. Generally, these incentives focus on improving financial returns by reducing regulatory hurdles that increase costs and delay cash flows to investors.

Infrastructure Recovery Charges

Infrastructure recovery mechanisms reduce "regulatory drag," cutting the time lag between capex outlays and the returns earned on those outlays, which can be as long as three years. Reducing the lag can improve returns significantly given the capex intensity of water infrastructure.

Typically, these mechanisms accelerate the addition of capex outlays into the rate base, where they can earn a return.

- "Capital Work In Progress" mechanisms allow utilities to add capex to the rate base during construction but require regulatory approval.
- "Distribution System Improvement Charge" mechanisms allow capex to be added to the rate base once completed, without the need for approval.[38]
- In either case, resulting infrastructure surcharges are typically capped at 5–7.5% of annual revenue.

Single Tariff (Pricing and CapEx)

Single-tariff legislation creates significant economies of scale for roll-up investors, allowing operators to present one rate case per utility platform, rather than one rate case for each system the utility operates.

It also allows the cost of improvements at one water system within a given utility to be spread over all systems owned by that utility. This eases the burden of expensive capital improvements needed at small systems, which would otherwise be forced to raise rates sharply.

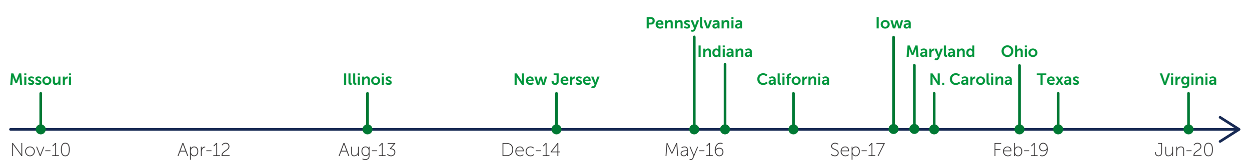
Fair Market Value Pricing

Fair Market Value (FMV) laws help make water system privatizations more attractive for buyers by allowing them to capture the full purchase price[39] in the resulting rate base, thereby allowing a return on goodwill.

In the absence of FMV laws, net book value is typically all that a buyer may include in the resulting rate base. Given the age of most systems, net book values tend to be well below market values, sometimes even $0.[40] Therefore, despite earning 9.5% on the rate base, that base may only represent a fraction of capital invested in the purchase of a utility.[41] Investors must be careful when evaluating utility investments.

On the other hand, the inclusion of goodwill in the rate base can create moral hazard, as both buyer and seller have incentives to raise the purchase price.[42] This can lead to higher water bills for customers and has made FMV laws somewhat controversial, but the pace of adoption is increasing.

FIGURE 13: FMV Passage Timeline



Under Consideration: Tennessee
Failed: Connecticut, Kentucky, Florida

SOURCE: Barings, 2021.

38. In some states, DSIC is only granted on a case-by-case basis.
39. Specifically, the lower of purchase price or market value. In practice, valuations are difficult and rarely below purchase prices.
40. Statutory depreciation schedules often assign useful lives that are shorter than the practical life of an asset, resulting in book value falling faster than market value over time.
41. Only applicable to initial privatization purchase price. Subsequent capex is eligible for rate base inclusion regardless of FMV. Sellers receive more cash and buyers can put more capital to work at a constant regulated return.
42. Sellers receive more cash and buyers can put more capital to work at a constant regulated return.

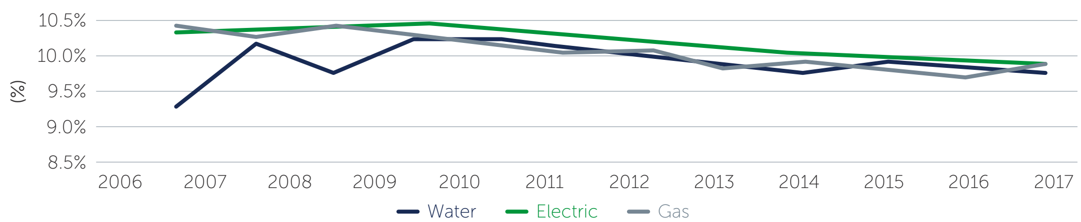
Revenue Decoupling

Rate structures that decouple utility revenue from usage volumes provide protection against declining volumes that result from water conservation trends. In traditional rate structures, the majority of utility revenues are volumetric. However, a few regulators have begun to shift towards a mix of fixed and volumetric pricing that allows utilities to generate the target return on equity (ROE) while promoting conservation.

Regulated ROEs

Regulated ROEs have declined slightly over the past decade, but the impact on investor total returns has largely been inoculated by the favorable regulatory trends described above.

FIGURE 14: Average Allowed ROEs as Authorized by State Regulators for U.S. Electric, Gas and Water Utilities (2016–17 YTD*)



SOURCE: Source: RRA (S&P Global Market Intelligence); EY analysis.
*2017 averages are based on rate cases resolved by September 2017.

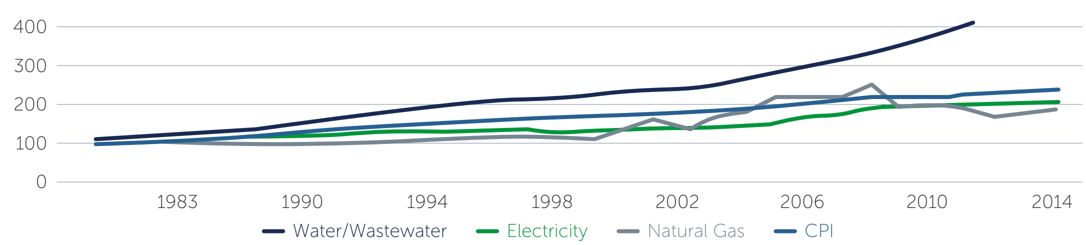
MARKET TRENDS

Pricing

Water prices have grown steadily as aging systems generate increasing maintenance costs. Prices have grown faster than those for other utility services—and significantly faster than inflation—given water's larger capital intensity. We expect this pricing trend to continue as aging infrastructure is replaced. Recently, price growth has moderated somewhat but remains well in excess of inflation.

It's important to note that rising water rates are not a sign of rising profit margins for utilities; instead, they reflect costs—including depreciation—that are passed on to customers. We see this as a healthy signal that the regulatory right to earn a return on capex is, by and large, functioning as expected and not being infringed upon by regulators.

FIGURE 15: Comparison of Utility Prices from 1983–2014, Index is set to 100 for 1982–1984



SOURCE: U.S. Bureau of Labor Statistics, 2014.

Demand

We believe long-term population growth in the U.S. will drive water use higher for the foreseeable future, with fewer opportunities for water conservation. However, it's worth noting that public water use fell 12% from its peak in 2005 through 2015,[43] though a large part of this was driven by an unusually severe drought as well as timing issues with the data.[44] Nonetheless, volumetric utility revenues fell unexpectedly during that period in affected states, though use in most states stayed the same or grew.

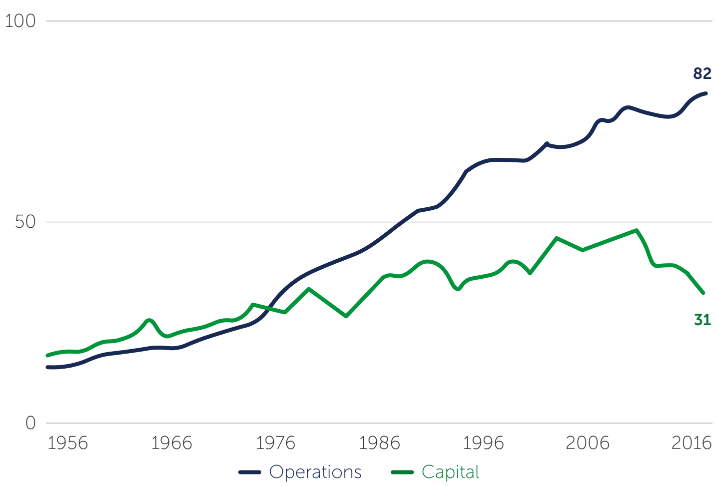
We expect 2020-use data—likely available in 2022—to show a modest rebound, as drought-related curtailment programs have lifted. However, public awareness and actions to support conservation efforts, such as showerhead or faucet replacements, have been elevated and will likely remain, though early actions made the greatest impact and additional efforts will be more limited and more gradual.

Government Spending

Despite the growing need for capital, actual capital expenditures are falling at municipally owned water utilities, which is a good proxy for the industry as a whole. The 2008 Global Financial Crisis reduced state tax incomes and forced cost cuts, and water capex became an easy target because the assets are out of sight and the resulting deterioration is invisible to taxpayers, at least in the near-term. Clearly, accumulating deferred capex is not sustainable, and utilities need to increase reliance on private capital to fund improvements.

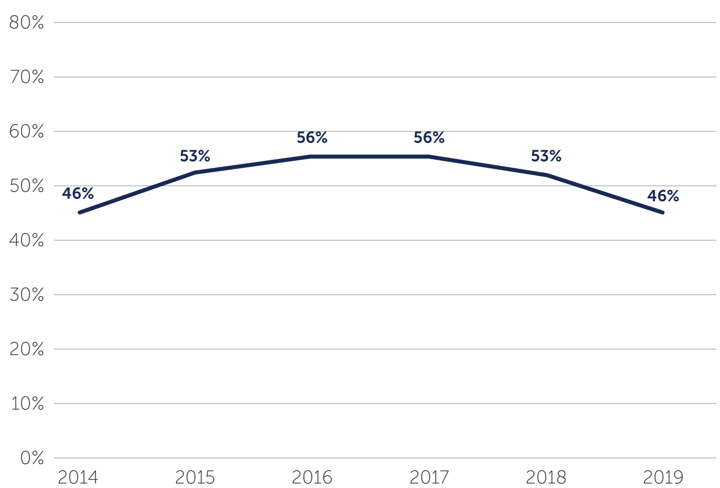
An annual industry survey indicates that industry participants perceive a decline in access to capital, a second indicator that municipal capex is becoming less available.

FIGURE 16: CBOE: Municipal Expenditures for Capital and Operations, Billions of 2017 Dollars, adjusted for inflation



SOURCE: Congressional Budget Office, Public Spending on Transportation and Water Infrastructure, 1956–2017, October 2018.

FIGURE 17: Access to Capital Trend: as Good or Better than Anytime in the Past Five Years



SOURCE: American Water Works Association, State of the Water Industry Report, 2019.

44. Water use is measured every half decade by the USGS, with the most recent measurement from 2015, the peak of the drought in the Southwest. As a result, the data is not representative of water use during an average year given significant mandatory and voluntary curtailment programs in place in 2015 that have since been lifted.

Renewed Focus on Quality

Clean water was an afterthought for many until the Flint, Michigan, lead-poisoning water crisis that began in 2014. Underground and out of mind, deteriorating infrastructure was also out of sight, leaving little political motivation to address it. The Flint crisis changed that, raising public awareness of the risks associated with poor management of an aging infrastructure, which helped fuel the movement already underway to ease legislative friction.

SECTION 3. OPPORTUNITIES COMING INTO VIEW

The combination of regulatory changes, increasing capital constraints, and public demand for better infrastructure has set off an early wave of activity from investors who sense an opening. Consolidation strategies appear particularly appealing given the demand and attractive pricing for medium-to-large systems. This is driven by long-standing public utility demand and, more recently, demand from large pools of investor capital that want to diversify into infrastructure and tackle environmental and social challenges as part of their mandate.

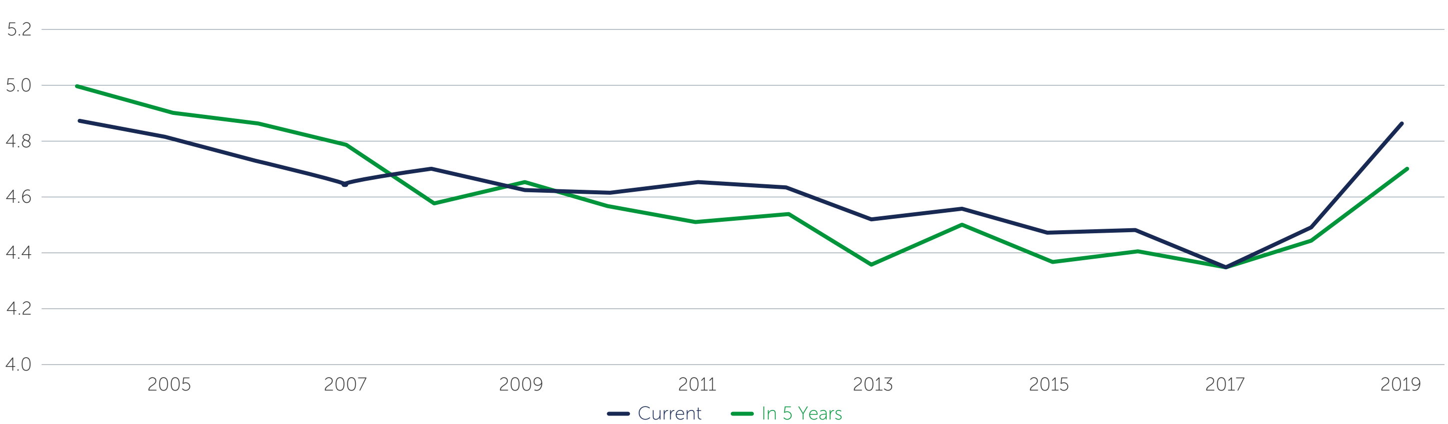
ANIMAL SPIRITS

After a protracted period of increasing pessimism, sentiment has risen sharply, coincident with an improving regulatory environment and a rise in public demand for better water infrastructure.

The two most common strategies in water utility investing are large platform buyouts and roll-ups. Large buyouts provide the least ability to enhance base returns but are attractive to investors with significant dry powder and lower cost of capital, namely publicly traded utilities and infrastructure investment funds.

Roll-up strategies tend to provide the greatest ability to enhance base returns through multiple expansion and cost efficiencies but require significant time and effort to execute. That, coupled with the difficulty in sourcing, provides a barrier to entry from casual investors and an opportunity for those willing to spend the time.

FIGURE 18: State of the Water Industry—All Respondents 2004–2019 (n=1,999)*



SOURCE: State of the Water Industry Report, American Water Works Association, 2019.
*On a scale of 1 to 7, where 1 = not at all sound and 7 = very sound.

TRANSACTION FLOW

On average, there are 120 transactions each year in the water and wastewater space. Publicly traded utilities win roughly one-third of these, leaving an average of 80 investment opportunities for private investors. These tend to be small operations with an average total enterprise value (TEV) of $1–$2 million. However, these systems typically come with an opportunity to deploy significant additional capital post-acquisition to make infrastructure improvements.

At these sizes, sellers are not typically represented by large investment banks, and uncovering deal flow requires local expertise.

Many publicly traded investor-owned utilities are the product of roll-up strategies, and some continue to pursue roll-ups. With borrowing costs at all-time lows and equity prices near all-time highs, these "strategics" are able to bid with an extraordinarily low cost of capital. Many trade with EV/EBITDA multiples in excess of 20-times.

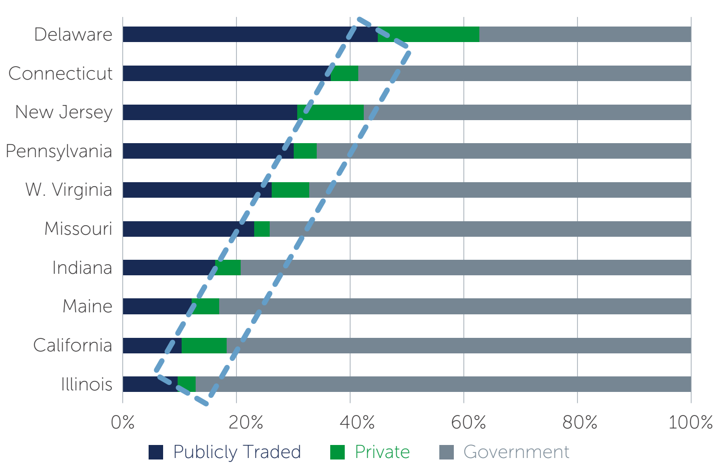
Private utilities tend to be sellers unless backed by a private equity sponsor.

Certain states actively encourage small, municipally owned utilities to consolidate in order to reduce costs, but this has had little impact on overall fragmentation. The strategy is not entirely new, even if the activity is gaining momentum. Private equity sponsors have executed several successful roll-ups dating to before the Global Financial Crisis; currently there are three water utility roll-up strategies underway in the U.S.

M&A COMPETITION

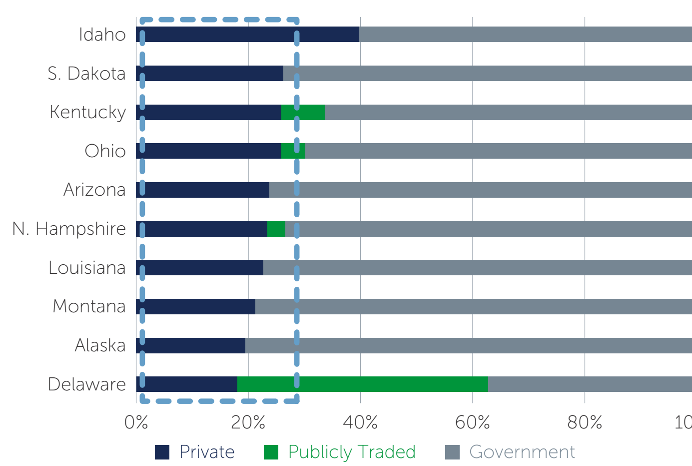
These private equity-led consolidation strategies are small relative to the number of acquisitions made by large, publicly traded utilities. However, as shown on the right below, there are plenty of acquisition targets in states where publicly traded utilizes are not established. Interestingly, where publicly traded utilities do have a large presence, there are few private utilities left to buy, indicating that new geographies may need to be identified.

FIGURE 19: Top 10 States—Publicly Traded



SOURCE: Barings data, 2021.

FIGURE 20: Top 10 States—Private Ownership



SOURCE: Barings data, 2021.

EXPECTED RETURNS

The low volatility in regulated returns provides a stable, attractive base return that is the foundation for any investment in the water utility space.

Currently, bidding for large utilities is in the mid single-digit internal rate of return (IRR) range. Small utilities trade at earnings multiples roughly half that of their large counterparts.

OPPORTUNITY FOR RETURN EXPANSION

There are several strategies available to enhance base returns.

Multiple Expansion

The most time-intensive and most lucrative is the multiple expansion available to roll-up strategies. Small utilities require expertise and significant effort to source, but we have seen them available at roughly half the multiples achieved by sellers of large systems.

Expense Synergies

Beyond multiple expansion, consolidation provides opportunities for expense synergies that do not require staff reductions,[45] as well as strategies for timing expense cuts to maximize their impact.[46] Finally, there are emerging technologies[47] that can reduce maintenance expenses that small utilities have been slow to adopt.

Large utilities employ teams of analysts to harness these strategies. Small utilities simply do not have these platform resources. As a sample success story, American Water, the largest U.S. publicly traded utility, is in the midst of a cost-reduction exercise that has yielded impressive results, freeing up capital to make infrastructure improvements that further enhance equity returns.

Leverage

Finally, utilities can enhance base returns by leveraging themselves to a greater extent than what is built into regulator return targets, though this strategy is limited by prudence and regulator preference.

45. In particular, with chemical purchasing, a water utility's number two expense, behind labor.
46. In general, regulators allow investors to share in the benefits of lowering costs, at least for a time.
47. Some as simple as automatic bill pay. Others, such as advanced leak detection, are more complex.

Jurisdiction

With 50,000-plus utilities and a myriad of state regulations, it is critical to have a clear framework through which to narrow the investable universe. Investing in the right jurisdiction is another tool to enhance base returns. Key considerations include:

1. *Construction Work in Progress Legislation:* Most states having adopted legislation that reduces the time between capex deployment and return on that capital, thereby increasing investor returns. This is accomplished by allowing utilities to increase water prices as capex is spent or immediately upon completion, rather than waiting until regulators verify and approve, which can come months to years after project completion.

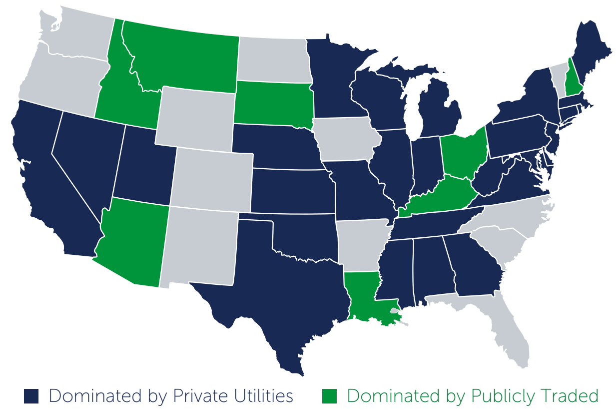
2. *Target-Rich Environment:* Consolidation strategies benefit from a concentration of targets in a single regulatory environment to make regulatory reporting, relationships, and interactions efficient. Therefore, states with significant geographical concentration are more attractive.

3. *Large Competitors:* Large, publicly traded competitors are able to bid aggressively for acquisitions given their low cost of capital and platform synergies, therefore avoiding such competition can decrease acquisition costs. Such competitors tend to bid within their existing footprints, making them easy to avoid.

4. *Single Tariff Legislation:* Single tariff or rate consolidation legislation allows consolidators to unlock capex opportunities at small water systems and create efficiencies in the regulatory process for utilities with multiple systems.

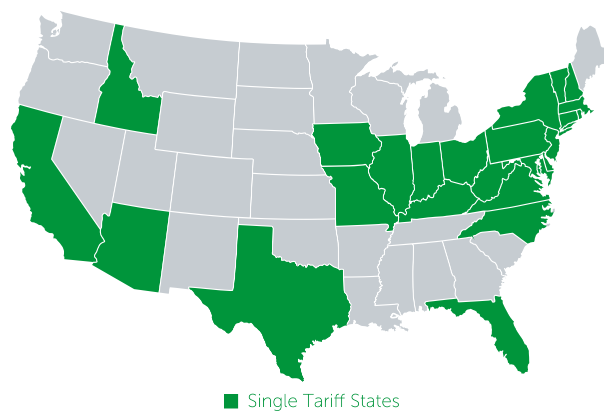
5. *Fair Market Value Legislation:* Known as FMV, such legislation opens the door for utility privatizations by allowing goodwill generated by an acquisition to be included in the rate base. This allows for a return on the full amount of invested capital.

FIGURE 21: Large Competitors



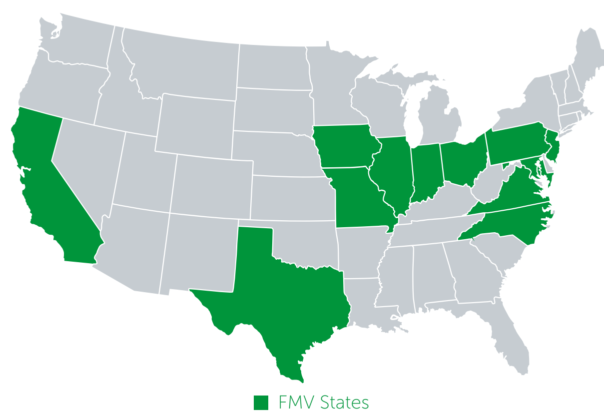
SOURCE: Barings, 2021.

FIGURE 22: Single Tariff Legislation



SOURCE: Barings, 2021.

FIGURE 23: FMV Legislation



SOURCE: Barings, 2021.

RISKS

There are risks to consider. Some of these include:

Poor Expense Management

As with any business, unplanned expenses lower equity returns. Given the relative age of most water infrastructure, unexpected repairs can be significant. Typically, unplanned operating and maintenance expenses are eventually included in the rate base, thereby neutralizing their impact to ROE, but that can take time. A management team with significant operating experience is an important component in expense management.

Water Consumption

The current movement towards conservation, especially in arid states, has driven declines in water consumption. Volume declines can be neutralized via discounts to purchase price or inclusion in water rates, but this trend will continue to weigh on profitability.

Although water demand is relatively inelastic to price in the short term, it can also decrease over time with rising prices.

Regulatory Risk

Regulators are tasked with balancing the needs of utilities and their customers, but they do have some leeway to interpret standards. Therefore, utilities have little practical recourse against unfair treatment in a transaction or rate case. In practice, regulators have not taken actions that would cut off capex sources or risk water quality. For example, California, known to be less favorable towards utility providers, increased rates to 200 basis points above the national average to ensure the financial stability of its water utilities.

Access to Raw Water and Raw Water Pricing

Though typically not a concern for geographically diversified medium-to-large utilities, smaller utilities can be at risk of losing access to their raw water supply through contamination or exhaustion.[48]

Typically, water utilities own the right to extract raw water and there is no need to purchase it, providing insulation from rising raw water prices. However, there are notable exceptions in arid regions where rising water prices can impact expense load. As with all operating and maintenance expenses, increases are passed along to customers through the rate-setting process, though this takes time.

Water Contamination Liability

All water utilities test water quality at multiple points to ensure compliance with federal and local standards. However, not all testing programs are effective, as evidenced in Flint, Michigan, where residents received water contaminated with lead. Ensuring rigorous testing is critical, as only one in four utilities (of any size) has fully mapped the use of lead pipes in their systems.

Sadly, the Flint crisis could have been avoided with better testing or management that was more experienced.

Cybersecurity/Terrorism

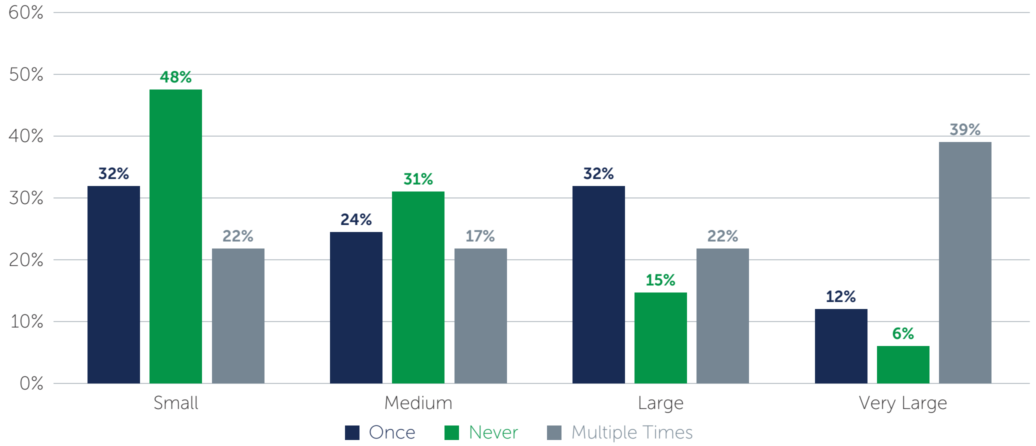
Cybersecurity and terrorist threats are not unique to the water industry. Small utilities are not as attractive targets as large utilities, but, nevertheless, ensuring proper security protocols remains essential. **(FIGURE 24)**

CapEx Drag

Unless otherwise specified, there can be significant time between capex outlays and their inclusion in the rate base, creating a drag on equity returns.

Targeting investments in states with infrastructure recovery legislation in place can help mitigate this.

FIGURE 24: Cybersecurity Events by Utility Size



SOURCE: American Water Works Association, 2019 State of the Water Industry Report.

CONCLUSION

The need to bring capital to the nation's water utility systems is clear: deteriorated water infrastructure affects both the population and the environment. Capital investments into water systems can reverse this trend by improving water quality, reducing wasted resources, reducing pollution, and still provide an opportunity to generate attractive returns.

With industry trends improving, investors have already begun to focus on water assets. The Biden infrastructure plan should support these activities by placing a spotlight on the problem, providing low-cost loans, and reducing credit risk by supporting low-income customers—all without crowding out private capital.

Consolidation projects look increasingly attractive with the confluence of two powerful trends. Regulators have a better understanding of the need to set conditions that draw private investment, and investors themselves are looking for projects that integrate sustainability strategies with competitive levels of profitability.

Investing in small water infrastructure projects requires industry expertise, a hyper-local focus, and boots-on-the-ground effort. These are significant barriers, but the need is urgent and teams with proven track records are available to help navigate.

APPENDIX

SAMPLE RATE CALCULATION

Part 1

Step 1a: Determine Rate Base	
Base = BV of Assets + W/C	
	($mm)
+ PPE, Gross	$97
- Accm. Depreciation	$0
+ Working Capital	$3
+/- [Varies by State]	0
Rate Base	**$100**

Step 1b: Determine WACC			
Based on Regulator's Target (not Actual) Capital Structure			
Cap. Struc.	Actual	Target	Target Cost of Cap
Debt	$55.0	**$50.0**	5.5%*
Equity	$45.0	**$50.0**	**9.0%**
WACC	$100.0	$100.0	7.3%**

In this example, actual leverage is slightly above target.
*Average. Actual Coupon at Utility.
**Weighted by Target.
Set by Regulator.

Step 2: Calculate Allowed Cash Return	
Rate Base * WACC	
	($mm)
Rate Base	$100.0
Target WACC	7.3%
Allowed Enterprise Return	**$7.3**
Debt Portion	$3.0
Equity Portion	$4.2

Step 3: Calculate Required Revenue	
Allowed Return and Operating Expenses	
	($mm)
Allowed Enterprise Return	$7.3
Op Expenses - Cash	$50.0
Op Expenses - D&A	$4.9
Taxes	$3.0
Required Revenue	**$65.1**

Part 2

Step 3: Estimate Usage	Fixed Allocation	Connections (by count)	Est. Volume (mm gal)	($mm) Fixed	($mm) Volumetric	Annual Cost (per Connection)	
Residential	45%	200,000	6,570	$15	$14	$141	$14
Commercial	40%	20,000	7,665	$13	$16	$1,447	$16
Industrial	15%	7,500	1,437	$5	$3	$1,049	$3
			15,672	**$32.6**	**$32.6**		

Step 4: Allocation ("Rate Design")				
Rate Type	% Alloc	$mm	Est Usage (mm gal)	Est Cost (000 gal)
Fixed	50%	$32.6		
Volumetric	50%	$32.6	15,672	$2.08

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ENDNOTES

1. American Society of Civil Engineers (ASCE). 2017 Infrastructure Report Card. 2017. https://www.infrastructurereportcard.org/wp-content/uploads/2016/10/2017-Infrastructure-Report-Card.pdf
2. U.S. Environmental Protection Agency. Drinking Water Infrastructure Needs Survey and Assessment: Sixth Report to Congress. March 2018. https://www.epa.gov/sites/production/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf
3. Ibid.
4. Quinn, Safriet, Feeney, and Lauf. National Economic and Labor Impacts of the Water Utility Sector. 2014. https://www.waterrf.org/research/projects/national-economic-and-labor-impacts-water-utility-sector
5. U.S. Environmental Protection Agency (EPA). Wastewater Primer. 2004. https://www3.epa.gov/npdes/pubs/primer.pdf
6. U.S. Environmental Protection Agency. Report to Congress on Impacts of Control of Combined Sewer Overflows and Sanitary Sewer Overflows. 2004. https://www.epa.gov/sites/production/files/2015-10/documents/csossortc2004_full.pdf
7. University of California. Hot Spots of Water Quality Violations, 2018 University of California—Irvine. "'Hot spots' of water quality violations: Problems more frequent in low-income, rural areas of the nation." ScienceDaily, February 12, 2018. www.sciencedaily.com/releases/2018/02/180212170017.html
8. Congressional Budget Office, Public Spending on Transportation and Water Infrastructure, 1956 to 2014. 2015. https://www.cbo.gov/system/files/2018-10/54539-Infrastructure.pdf
9. Steven Folkman, Ph.D., P.E. Utah State University. Water Main Break Rates in the USA and Canada: A Comprehensive Study. 2018. https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1173&context=mae_facpub
10. Barclays, North America Power and Utilities. Water: Emerging Investment Opportunity. March 22, 2017. https://www.investmentbank.barclays.com/our-insights/rising-to-the-water-challenge.html
11. EY. Can water be the new gas? Emerging investment opportunities in US infrastructure of the future. 2018. https://ipu.msu.edu/wp-content/uploads/2019/01/Water-as-New-Gas-2018.pdf
13. Folkman. Water Main Break Rates in the USA and Canada.
14. Barclays. Water: Emerging Investment Opportunity.
15. ASCE. 2017 Infrastructure Report Card.
16. EPA. Wastewater Primer.
17. Shelby Tucker, CFA. "American Water Works Company Inc.: Clear as Water; Initiating at Outperform." RBC Capital Markets. April 24, 2020.
18. U.S. EPA, SDWA data, FRA data. https://echo.epa.gov/tools/data-downloads/sdwa-download-summary
19. Peter H. Gleich. Water in Crisis: A Guide to the World's Fresh Water Resources. (Oxford University Press, August 1993). https://global.oup.com/ushe/product/water-in-crisis-9780195076288?cc=us&lang=en&
20. EY. Can water be the new gas?
21. U.S. Environmental Protection Agency. Drinking Water Infrastructure Needs Survey and Assessment: Sixth Report to Congress. 2015 https://www.epa.gov/sites/production/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf
22. ASCE. 2017 Infrastructure Report Card.
23. American Water Works Association. 2019 State of the Industry Survey. https://www.awwa.org/Portals/0/AWWA/ETS/Resources/2019_STATE%20OF%20THE%20WATER%20INDUSTRY_post.pdf
24. Folkman. Utah State University, Water Main Break Rates in the USA and Canada: A Comprehensive Study. 2018.
25. U.S. Environmental Protection Agency. Drinking Water Infrastructure Needs Survey and Assessment: Sixth Report to Congress. 2015 https://www.epa.gov/sites/production/files/2018-10/documents/corrected_sixth_drinking_water_infrastructure_needs_survey_and_assessment.pdf
26. Wells Fargo Securities, Utilities: Water Sub-Sector Snapshot. October 2019. https://saf.wellsfargoadvisors.com/emx/dctm/Research/ASG/Equity_Strategy/ASGSectorSnapshotsExternal.pdf
28. Bluefield Water Works & Improvement Co. v. Public Service Commission of W. Virginia (1923) 262 U.S. 679. https://supreme.justia.com/cases/federal/us/262/679/
29. Federal Power Commission v. Hope Natural Gas Co. (1944) 320 U.S. 591. https://supreme.justia.com/cases/federal/us/320/591/
31. U.S. Bureau of Reclamation. The Influence of Conservation Pricing and Other Non-Price Factors on Residential Water Demand. May 2014. https://www.usbr.gov/research/projects/detail.cfm?id=414
32. Ibid.
33. Ibid.
34. David Cutler & Grant Miller, The Role of Public Health Improvements in Health Advances: The Twentieth-Century United States I 2005. P.13. https://pubmed.ncbi.nlm.nih.gov/15782893/
35. E. Hemminki and A. Paakkulainen, The Effect of Antibiotics on Mortality From Infections Diseases in Sweden and Finland. 1976. https://pubmed.ncbi.nlm.nih.gov/1008114/
36. Water Quality Research Foundation. Boil Water Notices in the U.S., 2012-2014 – Executive Summary. P.2. https://wqa.org/Portals/0/WQRF/ResearchStudy_BoilWaterAlerts-ExecSummary.pdf
37. U.S. Environmental Protection Agency, Report to Congress on Impacts of Control of Combined Sewer Overflows and Sanitary Sewer Overflows. 2004. https://www.epa.gov/sites/production/files/2015-10/documents/csossortc2004_full.pdf
43. U.S. Geological Survey (USGS), Estimated Use of Water in the United States. 2010 & 2015 reports. https://pubs.er.usgs.gov/publication/cir1441
48. American Water Works Association, State of the Water Industry Report, 2019 https://www.awwa.org/Portals/0/AWWA/ETS/Resources/2019_STATE%20OF%20THE%20WATER%20INDUSTRY_post.pdf
49. Ibid.

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