

Water's Worth

Understanding the value of clean water

Keeping Water at the Tap
From Pump to Tap
Sustainable Solutions Now



Keeping Water at the Tap

A CRITICAL JUNCTURE FOR OUR MOST PRECIOUS RESOURCE

Every day, people across America access clean water by turning on a faucet to fulfill basic household needs from drinking and bathing to watering the lawn. Few think about what it takes to deliver that water. And even fewer are aware just how tenuous the future of their tap-ready water is, as increased demand meets an aging, under-funded infrastructure.

The massive network of pipes that makes it easy for 300 million Americans to take clean water for granted spans 700,000 miles. Some pipes, built to survive 50 to 75 years, have been in service for more than a century. Without renewal or replacement, U.S. water pipes that are classified as poor, very poor or life-elapsed will grow to 44 percent by 2020. The state of our water systems has earned an alarming D-minus grade from the American Society of Civil Engineers in its 2009 Report Card on Infrastructure.

It is clear that conservation of water and new techniques for its protection, treatment and delivery are critical and will not come cheaply. In fact, the EPA projects that as much as \$335 billion will need to be invested over the next 20 years if we are to keep clean water reliably at the tap.

Water will almost certainly become more expensive in the future than the penny a gallon the average American pays today. To understand why, and to appreciate the true value of water, it is helpful to understand how the infrastructure system works, what challenges the system faces, and the best ways to address those challenges.

THE CHALLENGES

While appearing simple, the water infrastructure actually requires a great deal of planning and investment. And much more needs to be done if this system is to continue meeting the demands of a growing population.

An Aging System

The vast majority of the nation's pipes were laid in three phases: the late 1800s, the 1920s and in the post-World War II boom era. Many of these aging pipes, the majority made of cast iron, are seriously corroded and leaking. Minor leaks go unnoticed but when a major water main bursts, huge and costly disruptions occur to the communities affected. People are forced to evacuate the area, business and industry shut down temporarily, streets are torn up, basements full of valuable equipment have to be pumped out, and a precious natural resource that we can ill-afford to lose goes down the drain. According to the Congressional Budget Office more than 20 percent of drinking water is lost every year to leaks in failing infrastructure.

Financing the Upgrades

Financing the upgrade of these aging pipes is another challenge. Water and wastewater infrastructure is second only to education in municipal expenditures — a cost that far exceeds the financial capabilities of many local water utilities. Despite spending roughly \$10.4 billion annually on modernization, there is currently an annual shortfall of at least another \$11 billion. That is how much it will cost to replace aging facilities near the end of their useful life and to comply with current and future federal water treatment regulations. And even these figures do not take into account any future growth in demand for potable water.

Shortages Loom

It is estimated that by 2013, 36 states will face serious water shortages due to growing demand and what is anticipated to be nature's declining ability to recharge existing raw water sources. Water reuse — by which "used" water is reclaimed, treated and distributed again — will become an essential part of the solution for stretching this critically limited natural resource.



From PUMP to Tap

The water infrastructure system is relatively (and deceptively) straightforward. From source to tap, water travels through three main channels: the pumping station, the treatment facility and the distribution system.

The **pumping station** serves two primary purposes. The first is to extract raw (untreated) water from a source — whether an underground aquifer, river or reservoir — and deliver it under pressure to a treatment facility that may be near the source or miles away. The second is to transport the water from the treatment facility to the distribution system. Usually perched above ground, the pumping station moves water 24 hours a day using large pumps, pipes and a power source to drive the pumps. Its sophisticated equipment requires regular maintenance and upgrades.

After raw water is pumped from its source, it is sent to a **treatment facility**. This is where water is treated to meet or exceed the levels of purity and quality set by the EPA, removing impurities and excess minerals through a combination of chemicals, a progression of filtration screens, and ultraviolet light. Water for drinking is obviously held to the highest quality standards, while “grey” water used in manufacturing processes — firefighting, landscaping and the like — may be processed at the same facility but with fewer treatment steps. Where more than one quality of water is produced, each treated water stream leaves the facility in its own color-coded conduit, assuring it will be used only as intended.

Treatment facilities must keep pace with increasingly stringent EPA regulations and the specific consumption and quality needs of the communities they serve. This calls for the need to continually test and update their processes, implementing new technologies and skills — advances that must be funded if these facilities are to remain in compliance with established standards.

Once the water has been treated it is ready to enter the **distribution system** — the network of mains, pressure gauges, booster pumps and building hook-ups that delivers water through the landscape and under highways and roads to homes, businesses, farms, industrial plants and a multitude of other destinations. Laid end to end, this extensive and intricate network of primary, secondary and tertiary pipes would be more than four times the length of the National Highway System! In order to ensure that an adequate supply of water is delivered where it needs to go, engineers run computer simulations of the hydraulic activity of the water to determine proper pressure, pipe sizing and other factors (a fire hydrant, for example, will require high levels of pressure and larger piping than will water for residential use).

Electricity is one of the largest recurring costs involved in all three channels of the water delivery system. Another significant expense is the building, replacing and upgrading of facilities and pipes. Yet another: the expansive team of highly trained specialists — hydrologists, civil, chemical and electrical engineers, and computer programmers — who design, monitor and protect our water systems both from the everyday challenges of equipment failure and the rare but real possibilities of catastrophic events, whether water-borne epidemic or terrorist attack. Therefore, though water itself is essentially “free,” the substantial infrastructure required to deliver it safely, cleanly and reliably is anything but that.

Sustainable Solutions NOW

Meet American Water



AMERICAN WATER

Founded in 1886, American Water is the largest publicly traded U.S. water and wastewater utility company. The company's 7,000 dedicated professionals provide drinking water, wastewater and other related services to approximately 15 million people in more than 30 states and parts of Canada. It maintains 80 surface water treatment plants, 600 groundwater treatment plants, 50 wastewater treatment plants, and approximately 48,000 miles of distribution and collection pipes. The combination of American Water's size, geographic spread, diverse technological ability and depth of experience, makes the company well positioned to address challenging new water realities. The company's commitment to excellence and innovation in delivering high quality water and wastewater service puts it at the forefront of research, developing new solutions such as water reuse and desalination to help ensure a sustainable water future for its customers.

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Three notable residential examples are the Solaire, Millennium Towers, and Tribeca Green luxury apartment buildings in downtown Manhattan. For the nearly 800 apartments and condominium units in these three buildings, wastewater is treated and recycled for toilet flushing, cooling, laundry and the irrigation of roof gardens and a surrounding park.

In Anthem, Arizona, American Water built an entirely new self-contained water, wastewater and underground storage system to serve over 8,500 customers living in a remote desert community north of Phoenix.

And in Fillmore, California, American Water formed a public-private partnership to design, build and operate a new, state-of-the-art zero-discharge wastewater treatment plant to replace the existing, outdated facility originally constructed in 1955. High-tech filtration will yield water 10 times cleaner than the old plant. This water will irrigate schools, landscape, city parks and green areas throughout Fillmore. This plant will recycle 100% of treated water, eliminating any discharge into the nearby Santa Clara River.

"Water reuse is becoming more important as our resources are stretched beyond their limits," says Tom Peterson, the Fillmore General Manager "We have been focused on this sustainable solution for many years and have become experts in using technology to help ensure supplies are available for generations."

What is water worth? Benjamin Franklin may have said it best: "When the well's dry, we know the worth of water." At about a penny per gallon, water that is treated and delivered reliably to homes and businesses across the country is an extraordinary value.