WATEREUSE

ACCESS TO SAFE & AFFORDABLE WATER:

THE CASE FOR INVESTMENT IN WATER REUSE

THE ONCE AND FUTURE SOLUTION

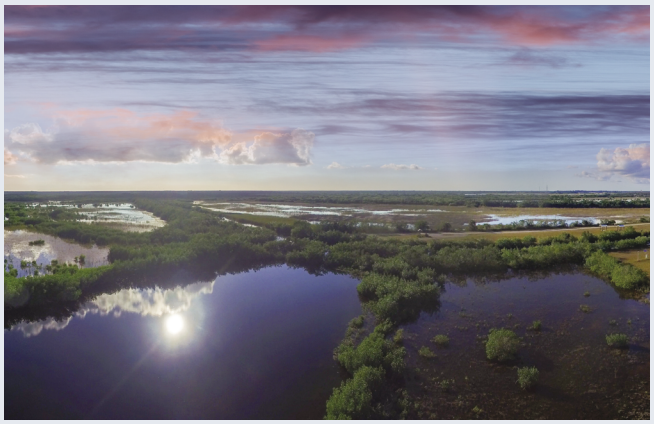
WATER REUSE IS A PRINCIPAL SOLUTION TO THE CHALLENGES OF WATER ACCESS, AFFORDABILITY, AND RESILIENCY.

Policy makers in Washington, D.C., are debating a generational opportunity to invest in water, upgrading infrastructure at a time when extreme weather across the nation is generating more frequent floods and drought. We can learn from hard-won experience on how we can secure water supplies for the future, investing today in water reuse to maintain access to water, and ensure its resiliency and affordability for decades to come. Water recycling programs throughout the nation successfully help mitigate the water supply consequences of climate change, ensure broader water accessibility and affordability, particularly in disadvantaged communities, and support economic stability and growth.

California's experience with climate change provides important lessons. In 1986, the then-modern drought of record in California began and did not end until late 1992. Water resources were depleted, including drastic reductions in reservoir levels, depletion of ground water, private wells going dry and agricultural land idled. One measure was the Oakland Hills fire that was the then-largest fire loss in US history, along with the tragic loss of 25 lives.

Due to changing weather patterns associated with climate change, drought conditions that shocked Californians in 1990 have become both more commonplace and more severe in the three decades since. This pattern is consistent with the "new normal" of climate change: extreme weather measured by more flooding from storms, diminishing mountain snowpack, premature snowmelt, and severe droughts which have lasted for longer periods and affected larger geographic regions.

In contrast to this constraint on water supply, the population of Southern California has increased by nearly 30% since 1990. Economics tells us that increasing demand while decreasing supply will drive up prices—causing hardship particularly for low-income and underserved communities with limited means. Yet California pulled off a miracle with the strategy adopted in the early 1990s that reduced potable water demands and provided new drought-proof supplies. Water providers



As climate change creates more challenges for water supply, management, and affordability, investment in recycled water is critical to ensuring water is accessible to all Americans.

and the state implemented ambitious policies, public health regulations, and projects to treat wastewater to near potable quality to replenish potable water supplies while advancing diverse non-potable uses to sustainably support economic activity and environmental priorities.

As the impacts of climate change across the country create more challenges for water supply, management, and affordability, investment in recycled water at the federal level is a critical element in ensuring a national water strategy is affordable and accessible to all Americans.

Water Reuse Ensures Access to Water Supplies at Affordable Rates

Overuse or inconsistent availability of groundwater or surface water can threaten water supply reliability and force communities to seek more costly water supply options. In addition, long-term dependence on limited groundwater has potential irreversible impact on the environment. Groundwater pumping without balanced replenishment, particularly when water levels are low, can cause land subsidence in low-lying areas within an aquifer and reduce flow and storage capacity causing sediment compaction where recharge of the aquifer is no longer possible.

Several factors have accounted for the increase in the use of recycled water over the past 60 years, including quality and safety, availability, and reliability.

In California, water reuse projects by the Eastern Municipal Water District (EMWD) and the Los Angeles County Sanitation Districts (LACSD) that started before the 1990s are delivering essential water supplies today. EMWD's Recycled Water System and Recycled Water Accelerated Retrofit programs have enabled the use of 100 percent of its recycled water for beneficial reuse. With an investment of over $200 million, EMWD's treatment plants recycle 48 million gallons per day (MGD) through a system of storage ponds and tanks—which store 2.3 billion gallons of water—to be used for agriculture, public landscaping, and industrial use. In 2020, recycled water comprised 35 percent of EMWD's water supply portfolio. As the district grows, EMWD is implementing an advanced water purification program to replenish its principal groundwater aquifer.

One of the key beneficial aspects of EMWD's program is pricing. In all cases, EMWD's recycled water rates are less than potable supplies purchased from regional sources. EMWD also prices recycled water based upon each customer's alternate options for water supplies. For example, for urban irrigation customers, EMWD's recycled water rate is 59% less than comparable potable water, at $556 per acre-foot rather than $1,354 per acre-foot. For agricultural customers, EMWD's base recycled rate is $151 per acre-foot.[i] This rate is established based upon these customers' foregoing pumping of groundwater at a comparable cost, and willingness to have annual restrictions on volume and flow rates. The use of recycled versus groundwater allows EMWD to limit overuse in the groundwater basin.

In southeastern Los Angeles County, there is a long history of using recycled water to replenish the Central Basin, which supplies about three million people with about half of their drinking water supply.[ii] In 1962, in collaboration with the Water Replenishment District, LACSD began operating the Whittier Narrows Water Reclamation Plant (WRP), the first water reclamation plant in the world built for the specific purpose of producing recycled water for groundwater replenishment. Since 1962, almost 2.2 million acre-feet of recycled water from that plant and two of LACSD's other plants have replenished groundwater supplies.[iii]

Several factors have accounted for the increase in the use of recycled water as a source of replenishment water over the past 60 years, including the quality and safety of the recycled water, the availability and reliability of the recycled water (especially when compared with imported water during drought conditions), and affordability. The cost of imported water relative to recycled water continued to rise precipitously. In 1981, WRD's cost for imported replenishment water was $67 per acre-foot. Recycled water cost $7 per acre-foot. As of 2019, the price for imported raw water was $820 per acre-foot compared to $65 for tertiary recycled water.

Eastern states are also turning to water recycling to address affordability, accessibility, and economic sustainability challenges. Pennsylvania, while not typically water scarce, experiences dry periods and

strains to watersheds and groundwater sources. The University Area Joint Authority, which serves Penn State University and much of the region, recycles approximately 3 MGD of water to ensure a sustainable supply, reducing the burden on the Spring Creek watershed and groundwater sources, and decreasing negative thermal impact on aquatic life. Implementing this program has helped stabilize rates—for the twenty-two years of the program, the rates have increased by 2.7% annually, on par with the average inflation rate.

The common theme among these projects is that well planned and designed investments in water reuse help conserve precious surface and groundwater resources, replenish and sustain critical aquifers, and ensure affordable access to water in regions facing sustained droughts, aquifer depletion, sea level rise, and sometimes all three.

Water Reuse Helps to Mitigate Rate Spikes from Water Scarcity and Aging Infrastructure

Forward thinking communities also use water reuse to avoid potable water rate spikes in low-income communities, which are disproportionally impacted by climate change in water scarce regions. In other regions, water reuse has helped decrease the cost of new infrastructure.

El Paso, Texas, for example, has a population of about 680,000 people and faces declining supplies of surface and groundwater. El Paso Water (EPWater) has engaged in long-term planning and made investments to ensure water demands will be met even in worst-case drought conditions through 2060 and beyond. Since the early 1990s, recycled water has played an important role. And in 2020, the city produced 125,131 acre-feet of potable water, with 40% coming from groundwater sources and 38% from the Rio Grande. More than 8,600 acre-fee per year of recycled water is used for non-potable demands.

EPWater realized that even more needs to be done to ensure water resiliency and economic stability. The agency is in the final design phase of a 10 MGD advanced water purification facility that will blend

Brooklyn's Domino District project is an example of a successful water utility/development partnership. The New York City Department of Environmental Protection offered developers a 25% rate reduction to build non-potable water reuse infrastructure.

and treat recycled water and brackish groundwater to provide a safe and drought-proof supplemental water supply by 2030. The $78 million cost is less expensive and more sustainable than importing additional water from outside the region. The cost of recycled water is $4 per 1,000 gallons to produce locally, compared to $9 per 1,000 gallons to import. Water reuse at $570 per acre-foot is also less expensive than desalination, which would cost El Paso's ratepayers $600 per acre foot.

For El Paso, a city that consistently ranks as one of the most affordable cities in the US, past and current investments in water reuse have reduced the cost of water. EPWater continues to have one of the lowest water rates in Texas, ensuring that El Paso continues to be a thriving and affordable city.

Water reuse is also sustaining economic development and community revitalization in water rich regions struggling with aging water infrastructure. For New York City, with 42 inches of rain per year, the drivers for water reuse are housing affordability and incrementally avoiding retrofit costs for the existing combined sewer systems, thereby averting rate payer impacts from multibillion tunnel projects.

The Domino District project in Brooklyn provides an example of how water utilities can partner with the development community to share in the costs and risks of water infrastructure challenges. The New York

City Department of Environmental Protection (DEP) offered developers a 25% rate reduction to build non-potable water reuse infrastructure. The benefit to DEP and the community is the reduction of more than 200,000 gallons per day of combined sewer flow and the reduced need of new and expensive sewer infrastructure, with corresponding decreases in demand for potable water. The reduction in the water rates also supports developers in keeping their 20% affordable housing commitment.

Water reuse reduces ratepayer costs and provides reliable, environmentally sustainable supplies. This is particularly important for disadvantaged communities throughout the nation that frequently face both water resource and financial challenges.

Water Reuse Supports Economic Stability and Growth

For water scarce regions, water reuse becomes a central component of planning for sustained economic growth in the future. For a smaller town like State College, Pennsylvania, the local utility, University Area Joint Authority (UAJA), distributes 3 MGD of recycled water to customers including for non-environmental purposes such as a car wash, hotel laundry and swimming pool, commercial laundry, and golf course irrigation. During the economic downturn in 2008, the only laundry business to stay open in the region was supplied by UAJA's less expensive recycled water.

Few areas of the world face this challenge more acutely than Southern California. The West Basin Municipal Water District (West Basin) recycles water in partnership with Suez Water Technologies for a cascade of uses that provide economic benefit, including multiple large refineries, urban greenspace watering, industrial cleaning and process water, and recharging aquifers. Not only does reuse provide a reliable source of water to support hundreds of thousands of jobs, but the program conserves enough groundwater and imported water to meet the needs of 80,000 households a year. Importantly, the program is designed to provide key industries a 100% reliable, climate-resilient supply of affordable water in a region prone to extreme drought and water restrictions.

West Basin prices recycled water based upon its end use and coined the term "designer water" to reflect its strategy for providing varying levels of treatment suited to specific needs – be it a refinery, a seawater injection barrier, or a municipal irrigator. As an example, West Basin sold imported treated water in 2020 to its customer agencies for $1,405 per acre-foot. Tertiary treated recycled water, on the other hand, ranged in price from $1,215 to $1,255 per acre-foot, representing a 11% to 13% discount for irrigation and similar non-potable uses.

West Basin also produces recycled water with additional levels of treatment. Pricing for this recycled water varies, and in all cases, is less expensive than other options available for the same end uses, including imported or other sources of water with similar levels of purification. Moreover, recycled water is resilient to drought and is not subject to periodic shortage allocations. The supply reliability and pricing structure provides an important economic foundation for high-water consumption industries.

The capstone of water reuse initiatives in the western US is the Regional Recycled Water Program (RRWP) being developed by the Metropolitan Water District of Southern California (MWD) in partnership with the Los Angeles County Sanitation Districts (LACSD). For this massive $3.4 billion project, which will be the largest potable reuse initiative in the world, LACSD will divert treated wastewater to MWD's advanced water purification facility before water is delivered to industrial users and to replenish groundwater basins, and potentially to augment raw water for potable reuse throughout the region. The majority of the purified recycled water is likely to be used to replenish groundwater basins, which provide about 40% of Southern California's water supply, and which otherwise rely on climate-dependent imported water or local stormwater runoff.

A planning study completed in 2019 analyzed costs for implementation of the project at 168,000 acre-feet per year of production along with various phasing

scenarios and determined the unit cost for the project is at $1,752 per acre-foot in 2018 dollars. Based upon MWD's other water supply costs, sales and resulting rates, the study further estimated the fully implemented project would have a $170 per acre-foot, or 16% impact on MWD's rates.

By comparison, the Pacific Institute estimates that ocean desalination on the West Coast of the United States would cost from $1,900 to $3,000 per acre-foot. Similarly, a publication surveying stormwater capture programs projected unit costs in the 25th and 75th percentiles ranging from $334 to $4,911 per acre-foot, with less reliability. Although the investment in RRWP is anticipated to be significant, it provides an important and relatively affordable drought-proof water supply alternative for Southern California's future. The economics are driven by the project's high degree of reliability compared to periodic and more frequent restrictions on imported water supplies impacted by climate change.

For Southern California and other supply-constrained areas, as well as in water rich areas struggling with aging infrastructure, the situation is clear: recycled water investments are inextricably linked to continued economic stability and growth.

CONCLUSION

Recycled water programs are a critical component of America's current and future water resources portfolio. They are helping communities stabilize water rates, sustain economic activity, and address environmental and infrastructure challenges. Moreover, water recycling programs throughout the nation successfully help mitigate the water supply consequences of climate change, ensure broader water accessibility and affordability, particularly in disadvantaged communities, and support economic stability and growth. Investment in recycled water at the federal level is a critical element in our national water strategy.

The WateReuse Association thanks George Hawkins and his team at Moonshot Missions for producing this white paper.

MOONSHOT MISSIONS

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[i] An acre-foot of water equals about 326,000 gallons, or enough water to cover an acre of land 1-foot deep

[ii] This example is derived from information in Water Replenishment District, "Our Road to Independence" 2019 (available at: https://www.wrd.org/sites/pr/files/Our%20Road%20To%20Water%20Independence%2C%20WRD.pdf).

[iii] LACSD, 31st Annual Report on Recycled Water Reuse, Fiscal Year 2019-2020, p. 7 (available at: https://www.lacsd.org/civicax/filebank/blobdload.aspx?blobid=23890).

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