

California Urban Water Agencies

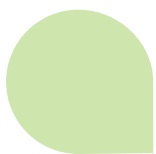
Meeting California's Water Needs

Water Reuse Update

March 2014

Updated October 2014





On the cover (clockwise from top-left):

- SFPUC's Living Machine enables building-scale reuse.
- EBMUD's East Bayshore tertiary treatment plant provides recycled water for landscape irrigation and commercial uses.
- Improved conservation with water efficient landscape complements water reuse efforts.
- Recycled water pumps serve wholesale customers in the MWDSC service area.

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Overview

The California Urban Water Agencies (CUWA) is committed to advancing water reuse to help meet the State's current and future urban water needs. Water reuse is a critical element of the State's overall water supply portfolio, and depending on local, site-specific circumstances, it can be a good fit for many water utilities. As noted in CUWA's Water Supply Reliability Report (2012), CUWA agencies are taking action on many fronts to promote a diverse portfolio and reliable, high-quality water supply, including water conservation, surface water, groundwater, desalination, exchanges, and other local supplies, as well as water reuse. Water supply portfolios are unique to each agency's needs and reflect a full range of factors such as reliability, protection of public health and the environment, location and availability, cost, and energy requirements, among others. Diverse portfolios are key to providing resilient supplies to meet future challenges and uncertainties.

Water reuse projects implemented by CUWA member agencies to date provide a total of 320,000 acre-feet/year (AFY) of supply. This existing water reuse is almost exclusively non-potable, with application to landscape irrigation, commercial and industrial uses, dual plumbing, and environmental benefits, as noted below.

CUWA agencies are also leading efforts to expand their annual water reuse to at least 600,000 acre-feet (AF) by 2030, and possibly to 900,000 AF or more (Figure 1). With further advancements to allow direct potable reuse in California, there will be more potential opportunities for growth in water reuse statewide. As with other sources of water supply, water reuse must, first and foremost, continue to be fully protective of public health and the environment. CUWA agencies are working with the State Department of Public Health, WaterReuse, and the Water Research Foundation to ensure that future potable reuse requirements have a solid technical basis and are fully protective.

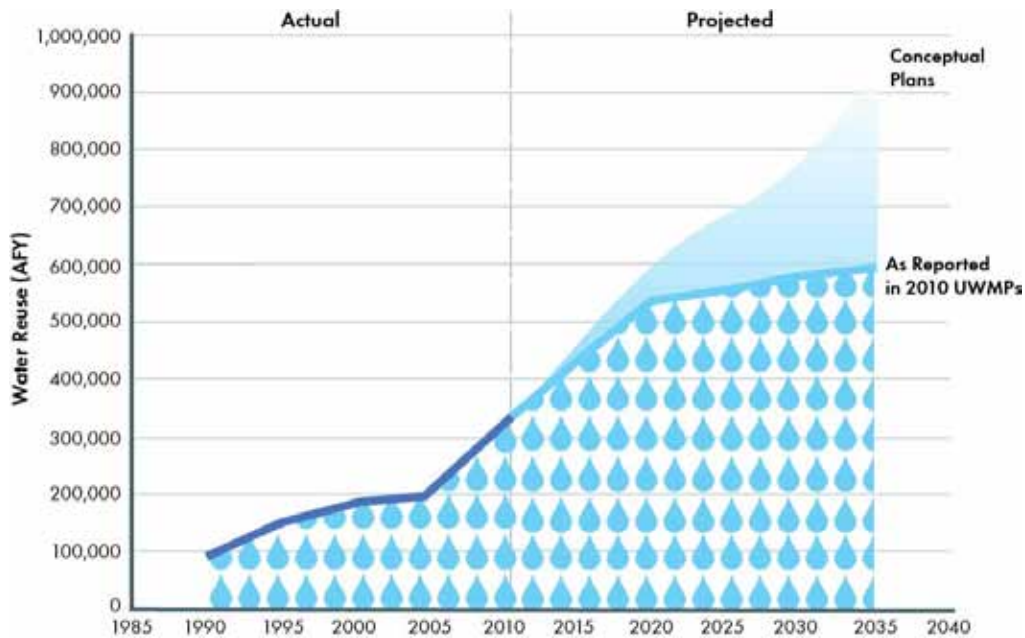


FIGURE 1. CUWA AGENCIES HAVE CONCEPTUAL PLANS IN PLACE TO TRIPLE WATER REUSE BY 2035

Note: Data in this plot reflect actual (historic, 1990-2010) and projected future, 2015-2035) water reuse, which may be less than treatment capacity. Some CUWA agencies have updated their water reuse plans and projections since their 2010 UWMPs. See agency websites for more information.

Introduction and Objectives

A diverse water supply portfolio is critical to California's future to meet increasing demands and to address future uncertainty. There is no one solution to meet future water demands. To ensure reliability for their customers, CUWA member agencies have been diversifying their water resources portfolios, and water reuse is an important aspect of this diversification.

The objectives of this Water Reuse Update are as follows:

- To provide a framework for urban water reuse in California, including reuse methods.
- To demonstrate the importance of water reuse to some water supply portfolios to provide a drought-resistant source.
- To summarize the current status of water reuse practiced by CUWA agencies and to demonstrate how site-specific considerations have affected individual agency applications of water reuse.
- To highlight ongoing and planned CUWA agency efforts to advance water reuse in the future in a safe and cost-effective manner, appropriate for local needs.

Section 1 Background and Context

In August 2012, CUWA released its Water Supply Reliability (WSR) Report to demonstrate how its member agencies are working individually, and with other agencies, to improve the reliability of water supplies through investments in water use efficiency, supply diversification, and system improvements. The WSR Report summarizes past, present, and future actions to improve urban water management among CUWA agencies, and is based on information provided in CUWA agencies' 2010 Urban Water Management Plans (UWMPs).

CUWA agencies are committed to water use efficiency and supply reliability, in part through developing conservation and water reuse projects and providing leadership to promote water use efficiency in their own service areas and statewide. Progress and plans for water conservation are addressed extensively in the CUWA WSR Report. This Water Reuse Update builds on the water use efficiency discussion in the WSR Report with a focus on water reuse. CUWA has also developed Water Reuse Policy Principles to summarize their perspectives http://cuwa.org/pubs/WR_PolicyPrinciples_07312013.pdf

As demands grow and uncertainties intensify (e.g., potential effects of climate change, droughts), water reuse for potable and non-potable uses is an increasingly important component of some water supply portfolios. Water reuse is a resilient, local drought-resistant source of supply option for current and future water planning and has been identified as a best use of the State's limited water resources. Water reuse can also provide an additional benefit of putting wastewater discharges to beneficial use, which may help wastewater agencies meet discharge requirements and protect receiving waters.

As noted in CUWA's Water Supply Reliability Report, there is no one-size-fits all solution to water resource challenges, and water reuse is no exception. Depending on local conditions, water reuse may or may not be an appropriate strategy for individual water suppliers. Applicability is site-specific and depends on factors such as demand for beneficial uses,



Hayward Marsh Project

Alameda County Water District

In the ACWD service area, Union Sanitary District, the agency responsible for wastewater treatment and disposal, delivers approximately 3.5 mgd of high-quality, treated effluent to the Hayward Marsh Project. Although this is the only example of beneficial water reuse in the area currently, ACWD has also implemented more cost-effective local alternatives, including desalination of brackish groundwater and conservation programs that are focused on reducing outdoor use. Recycled water could be a potential future source of supply for ACWD, especially in light of uncertainties with the reliability of existing imported supplies and a potential rebound of water demands in the service area with growing population. ACWD intends to continue to evaluate the potential timing for a future recycled water project.

location, cost-effectiveness, energy intensity, protection of public health, and availability of other supplies. Constraints and opportunities related to water reuse can differ significantly for northern California and southern California agencies, for example, given these factors. Water suppliers are responsible for efficiently managing the makeup of their water supply portfolio, including the use and extent of water reuse, and consider the best mix of available supplies to achieve water use efficiency, supply reliability, and environmental goals.

As with other new water sources, costs for water reuse supplies can be higher than existing sources. Indirect potable reuse can require redundant infrastructure, and the costs of direct potable reuse will also likely be relatively higher but will not be fully known until the state has developed regulatory criteria. In some cases, even where water reuse may not be the most cost-effective option, agencies also consider other factors, such as reliability, and may choose to invest in developing potable reuse supplies. In addition, they may be able to secure grant funding. In other cases, water reuse is not yet a good fit for local needs.

Water reuse for non-potable applications such as irrigation is well-established. The importance of water reuse for potential potable applications is increasingly recognized by California's leaders. Sponsored by a CUWA agency, Senate Bill (SB) 322 became law in October 2013. SB 322 directs the California Department of Public Health (CDPH), whose Drinking Water Division transitioned into the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) in July 2014, to investigate the feasibility of developing uniform water recycling criteria for direct potable reuse and to report their findings by September 2016. When Governor Brown signed SB 322, he released a statement indicating that "This information is past due... California needs more high-quality water, and recycling is the key to getting there." In fact, many are hoping that the SWRCB DDW will be able to progress beyond a feasibility study and be well on the way toward actual criteria by late 2016.

The State also encourages water reuse through the Water Conservation Act of 2009 (SBx7-7). This legislation requires urban retail agencies to reduce per capita water demands

to achieve a statewide reduction of 20 percent by the year 2020 (20x2020). Failure to achieve 2020 per capita usage targets jeopardizes agency eligibility for future State funding opportunities. Water reuse is recognized in SBx7-7 as a direct contribution toward meeting reduced per capita consumption goals (i.e., a potable demand reduction).

The SWRCB's Recycled Water Policy, adopted in 2009 and amended in 2013, established statewide goals to increase water reuse above 2002 levels (500,000 AFY) by at least 1 million acre-feet per year (MAF/year) by 2020 and by at least 2 MAF/year by 2030.

In addition to meeting the 20x2020 goal, CUWA agencies are also committed to continuing the advancement of water reuse beyond 2020. CUWA agencies and other water suppliers across the State are taking steps to advance water reuse on multiple levels and to contribute toward the State's goals.

Section 2 Types of Water Reuse and CUWA Applications

CUWA agencies are leading the way in planning and implementing safe and reliable water reuse projects for various intended uses and scales.

The level of treatment required depends on the intended uses, which range from non-potable reuse (NPR), to indirect potable reuse (IPR), and direct potable reuse (DPR). Water suppliers in California have implemented NPR and IPR for many years, while the feasibility and safety of DPR is currently being explored. Regardless of use, CUWA agencies are committed to providing appropriate levels of treatment to continue delivering safe and reliable, high quality potable and non-potable water.

Frequently Used Acronyms

AFY	acre-feet per year (1 AFY = 8.927E-4)
DPR	direct potable reuse
IPR	indirect potable reuse
mgd	million gallons per day (1 mgd = 1120.15 AFY)
NPR	non-potable reuse

For the purposes of this Water Reuse Update, terms are defined as follows:

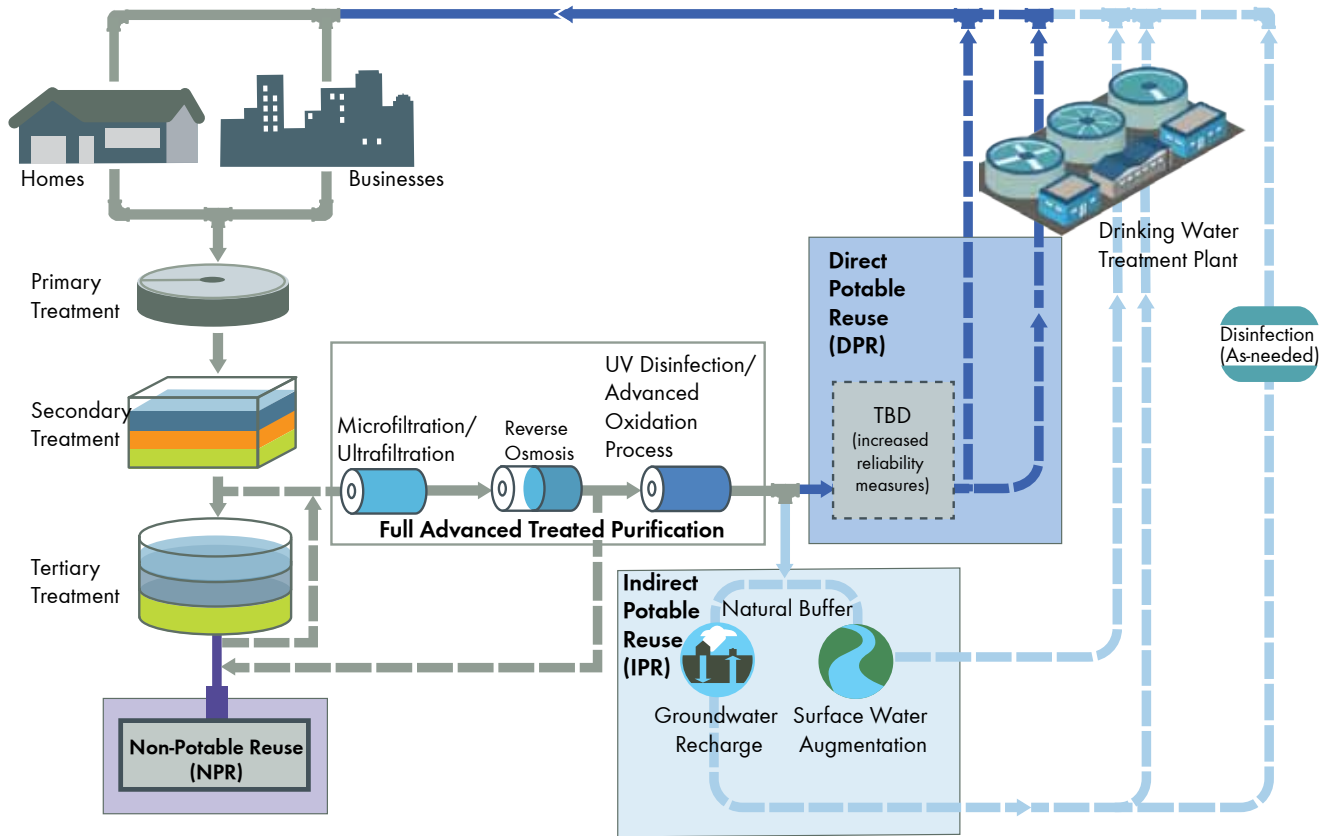
Recycled water – Water that originated from homes and businesses as municipal wastewater and has undergone a high degree of treatment at a reclamation facility to meet specific water quality standards so that it can be beneficially reused for a variety of non-potable purposes.

Full advanced treated purified water – Water of wastewater origin treated with methods at least as effective as membrane filtration, reverse osmosis, advanced oxidation, disinfection, or other equivalent treatment as approved by SWRCB DDW. Advanced levels of treatment are used so that the purified water can be added to water supplies ultimately used for drinking water (i.e., potable reuse).

Figure 2 shows example treatment configurations for non-potable, indirect potable and direct potable reuse. As shown in the graphic, additional levels of treatment are required to move beyond non-potable reuse to potable applications, and can be provided by both engineered and natural systems. Although direct potable reuse guidelines are still in development for the State of California, the major difference between indirect and direct potable reuse is the addition of engineered storage buffers to retain water for sufficient time to allow analytical testing and verification prior to introduction of the purified water into the public water system. Various beneficial uses for each of the three types of reuse and specific examples for CUWA member agency applications are presented in the following section.

FIGURE 2. LEVELS OF REUSE TREATMENT AND INTENDED USES

Note: Multiple possible treatment scenarios are shown and may vary depending on a number of factors.



Non-potable reuse. NPR includes any application of recycled water not involving drinking water for human consumption. NPR water originates from homes and businesses as municipal wastewater and undergoes tertiary treatment at a reclamation facility to meet specific water quality standards (i.e., Title 22 of the California Code of Requirements).

Indirect potable reuse. IPR is the application of multiple levels of treatment to achieve full advanced treated purified water for groundwater recharge or surface water augmentation, upstream of a water treatment plant, using these natural buffers for treatment.

Direct potable reuse. DPR is the planned introduction of full advanced treated purified water directly into a public water system's treated or raw water supply. DPR may include increased reliability measures in lieu of a natural buffer and will be better defined through ongoing research.

2.1 Non-potable reuse (NPR)

CUWA member agencies already practice extensive water reuse, totaling 320,000 AFY, almost exclusively for non-potable uses. An overview of different types of NPR uses and a few specific examples for CUWA agencies are summarized below.

Environmental benefits. NPR can provide environmental benefits by supplying recycled water to wetlands and marshes. One example is the partnership between Alameda County Water District (ACWD) and the counterpart wastewater agency in their service area, Union Sanitary District, which provides wastewater distribution, treatment, and effluent disposal. As part of Union Sanitary District's effluent disposal program, approximately 3.5 million gallons per day (mgd) of high-quality, treated effluent is provided to the Hayward Marsh Project (located within the ACWD service area) as a fresh water source for the marsh.

Landscape irrigation. Landscape irrigation is one of the most prevalent applications of recycled water in the State and can include parks, playgrounds, school grounds, golf courses, residential landscaping, and cemeteries. Many suppliers have irrigated landscapes with recycled water for decades. The City of Los Angeles has irrigated Griffith Park with recycled water since 1979. The City of Livermore, one of the retail agencies that receives water from Zone 7, has irrigated Las Positas Golf Course with recycled water since 1974.

Agricultural uses. Recycled water can be used for food crops that are surface-irrigated, with the edible portion being above-ground. Some CUWA agencies provide water to agricultural users that may use recycled water for purposes such as irrigation and/or production in the future.

Industrial/commercial uses. Recycled water can be used for many industrial and commercial applications, including cooling, toilet and urinal flushing, fire-fighting, decorative fountains, car washing, and street cleaning. For example, industrial water reuse is a significant component of the East Bay Municipal Utility District (EBMUD) recycled water program. In a flagship project with a refinery, EBMUD provides recycled water for cooling tower and boiler feedwater applications. The refinery funded the capital cost, and is funding the ongoing operations and maintenance costs.

Building/district scale non-potable reuse. NPR can be scaled to the building or district level. The San Francisco Public Utilities Commission (SFPUC) is leading by example, incorporating onsite treatment of gray and black water at its new headquarters. The onsite "Living Machine" reclaims and treats all of the building's wastewater to satisfy 100 percent of the water demand for the building's low flow toilets and urinals. The system treats 5,000 gallons of wastewater per day and reduces per person water consumption from 12 gallons (normal office building) to 5 gallons per person, equivalent to a 60 percent reduction in the building's potable water use.



Large Scale Industrial Reuse

East Bay Municipal Utility District

Because EBMUD's primary source of potable water (Mokelumne River watershed) can be impacted by droughts, EBMUD has diversified its portfolio to include other resources including recycled water. EBMUD first began distributing recycled water to customers in the 1980s, and its current program primarily consists of non-potable uses for large-scale industrial reuse, urban landscape irrigation, and commercial applications for a total of about 9 mgd. In a flagship project with a refinery, EBMUD provides recycled water for cooling tower and boiler feedwater applications. The refinery funded the capital cost, and is funding the ongoing operations and maintenance costs. To meet a goal of 20 mgd of recycled water by 2040, EBMUD is planning a number of other projects, including more industrial reuse, centralized urban irrigation and commercial projects, and satellite facilities or onsite recycling.



Building and District Scale Reuse

San Francisco Public Utilities Commission

SFPUC is diversifying its water supply portfolio by developing and exploring additional water supplies, including recycled water and other alternate water sources. To promote the use of NPR in new multi-family residential and commercial developments, SFPUC worked with the City's Departments of Public Health and Building Inspection to develop San Francisco's Non-potable Water Program. SFPUC is also leading the way in NPR by incorporating onsite treatment of gray and black water applying a "Living Machine" to reclaim and treat all of the new headquarter building's wastewater to satisfy 100 percent of the water demand for the building's low flow toilets and urinals (see main body text).

2.2 Indirect potable reuse (IPR)

The concept of IPR is not a new one. For many years, incidental water reuse has occurred through discharges to local water bodies, providing a water supply benefit to downstream users. For example, more than 300 permitted wastewater dischargers are located upstream of the City of San Diego's raw drinking water supplies. Water suppliers are now taking water reuse a step further through planned indirect potable reuse projects using a combination of treatment and natural buffers.

A few specific examples are summarized below.

Groundwater recharge. Water reuse can be beneficially applied to improve groundwater supplies through various applications. Groundwater recharge allows for soil aquifer treatment as recycled water percolates through the ground, replenishes aquifer supplies, and can also provide a seawater intrusion barrier. Full advanced treated purified water can be directly injected into a groundwater aquifer. The groundwater can later be pumped out of the aquifer and either treated further or distributed directly into the drinking water delivery system.

One of the first applications of IPR through groundwater replenishment with advanced treated water in California was the Orange County Water District's Water Factory 21, which began providing reverse osmosis treatment of recycled water to prevent seawater intrusion in 1976. Orange County Water District later implemented their Groundwater Replenishment System, which has provided full advanced treated purified water for Orange County since 2008. The Groundwater Replenishment System, which is jointly-funded by the Orange County Water District and the Orange County Sanitation District (non-CUWA members), has a 70 mgd capacity and produces enough water for nearly 600,000 people.

CUWA members are also pursuing IPR as a water supply strategy. The proposed Los Angeles Department of Water and Power (LADWP) Groundwater Replenishment Project would increase groundwater recharge in the San Fernando Basin using full advanced treated purified water from the City's Donald C. Tillman Water Reclamation Plant to supplement drinking supplies. The purified water would be used to replenish up to 30,000 AFY at existing spreading grounds and to inject into the aquifer at new injection wells by 2022.

The Santa Clara Valley Water District (SCVWD) is also evaluating potable reuse. The \$70M Silicon Valley Advanced Water Purification Center (SVAWPC) is a state-of-the-art treatment facility in San Jose that can produce purified water using microfiltration, reverse osmosis, and ultraviolet disinfection. Purified water from the SVAWPC is blended with tertiary-treated recycled water from the nearby South Bay Water Recycling facility. The blended water improves water quality for non-potable purposes and allows for a wider variety of uses. This new advanced treatment facility is also being used for potable reuse demonstration testing, similar in concept to water quality testing demonstration



Los Angeles Groundwater Replenishment Project

Los Angeles Department of Water and Power

LADWP, in collaboration with the City's Bureau of Sanitation, is proceeding with its proposed Los Angeles Groundwater Replenishment Project to increase groundwater recharge in the San Fernando Basin using purified, advanced treated recycled water to supplement drinking supplies. The proposed project involves construction of an advanced water purification facility to treat recycled water from the City's Donald C. Tillman Water Reclamation Plant. The purified water would be used to replenish up to 30,000 AFY at existing spreading grounds and at new injection wells. The Environmental Analysis for the project was launched in September 2013, and the Groundwater Replenishment project will be operational by 2022.

projects completed by other water agencies, such as the City of San Diego, LADWP, and Orange County Water District/ Orange County Sanitation District. The intent of this testing is to demonstrate superior treatment removal efficacies in order to secure conceptual approval from the regulators for a potential full-scale potable reuse project. SCVWD has not yet committed to a particular potable reuse project and may consider IPR, DPR, or a combination of both.

Surface water augmentation. Full advanced treated purified water can be added to a surface water reservoir, where it blends with raw water and is further treated and disinfected at a conventional drinking water treatment plant before being distributed into the drinking water delivery system. After completing a 1 mgd water purification demonstration project in 2013, the City of San Diego received conceptual approval from its regulators to construct a full-scale project for reservoir augmentation. Water quality testing of 342 constituents over a one-year period demonstrated that the purified water produced at the demonstration project met

or exceeded all State and federal drinking water standards. Additionally, total dissolved solids for the purified water averaged a remarkably low 15 parts per million, offering the region tremendous salt management benefits.

2.3 Direct potable reuse (DPR)

As noted above, an expert panel is expected to weigh in before December 31, 2016 on the State of California's ability to adopt criteria for direct potable reuse. Their recommendations will be based on a long history of successful indirect potable reuse projects and a large body of research.

Following the City of San Diego's IPR demonstration study described above, the San Diego City Council directed its Public Utilities Department to also evaluate DPR that could ultimately result in the production of up to 83 mgd of purified water supplies from three recycled water treatment locations. This amount of water would represent approximately 40 percent of San Diego's future (2035) water demands. In addition to water supply reliability and water quality improvements, DPR offers the City of San Diego a long-term, sustainable approach for satisfying more restrictive wastewater ocean discharge requirements.



Silicon Valley Advanced Water Purification Center

Santa Clara Valley Water District

Released in 2012, SCVWD's Water Supply Infrastructure Master Plan identified potential water supply shortages of up to 47,000 AF by 2035 and called for expanding recycled water from the current 17,500 AFY to 50,000 AFY by 2035. This increase will be met by expanding NPR and implementing potable reuse. In alignment with these goals, the SCVWD's Board has set an ambitious but achievable target of having recycled water comprise 10 percent of county water supplies by 2025.

SCVWD has nearly completed a \$70M Silicon Valley Advanced Water Purification Center that will initially produce NPR water and that will lay the groundwork for future regulatory approval of potable reuse (see main body text). In addition, SCVWD has embarked on an ambitious outreach program to educate stakeholders about all aspects of recycled water to build credibility and garner public acceptance for future recycled water projects.



City of San Diego Advanced Water Purification Facility

City of San Diego Public Utilities Department

Through the operation of the 1-mgd Advanced Water Purification Demonstration Project (see main text), the City has verified the viability of expanding their water reuse capacity while producing a new safe, reliable, and uninterrupted water supply. The City is now responding to the directives from the City Council and further defining its potable reuse options as it moves toward implementation of a full-scale potable reuse project that could ultimately result in up to 83 mgd of purified water supplies.

While studies aimed at determining the feasibility of a full scale project are now complete, the Demonstration Facility remains operational for in-situ testing of equipment and protocols for DPR. Through the WaterReuse Foundation's DPR Initiative and other grant funding, the City will continue operation of the Demonstration Facility for public outreach and research. The research involves development of real-time monitoring strategies and controls that will provide "failsafe" treatment barriers to remove the risk of any substandard water reaching potable water supplies to protect public and environmental health. The outcomes of this research will provide essential data and recommendations for regulatory assessment and permitting of future direct potable reuse projects.

Section 3 Advancing Water Reuse

As demonstrated in the previous sections, CUWA agencies currently reuse about 300,000 AFY. Beyond that, the agencies are planning additional water reuse to potentially triple that level to 900,000 AFY. To further advance water reuse statewide, more work is needed in several key areas - establishing a regulatory framework and sufficient underlying research to answer important unanswered questions (particularly for potable reuse), engaging the public to broaden understanding and acceptance of reuse, and leveraging partnerships to implement projects.

3.1 Establishing a Regulatory Framework

Of paramount importance to CUWA agencies is the protection of public health and the environment. This applies to the State's water reuse requirements, which are among some of the strictest in the country, providing a framework for protection based on water quality objectives, multiple levels of protection, and mandatory monitoring and public reporting.

CUWA agencies support reasonable regulatory oversight to keep non-potable reuse projects cost-effective. For example, San Diego County Water Authority (SDCWA) provides technical assistance and coordination for its member agencies on such issues as streamlined oversight of use sites and development of salt and nutrient management plans. Ultimately, regulations need to provide a level of consistency and certainty to effectively advance water reuse, while recognizing site-specific conditions in the application of regulations. This will ensure that local needs, such as the protection of local groundwater basins, are met.

CUWA agencies are actively working with regulators (e.g., SWRCB's Division of Drinking Water), and relevant organizations (e.g., WateReuse California and Water Research Foundation) to help inform and guide new proposed water reuse regulations and legislation to increase water reuse for non-potable uses and to enable and encourage further progress toward potable reuse where appropriate (Figure 3). This coordinated effort is intended to provide more clarity on regulatory requirements, and ultimately enable more efficient navigation of the regulatory process. Streamlined and efficient regulations are needed to provide consistency, sufficient protection of public health, and flexibility to meet local needs. This is especially important as more agencies look to move from non-potable to potable reuse options.

Individual CUWA agencies are also providing funding for critical DPR research through the Water Research Foundation and/or the WateReuse Foundation. The research will strengthen the scientific basis for DPR by addressing critical outstanding technical issues. The research focuses on many aspects, such as assessing and evaluating critical control points, source water control options, blending requirements for water from DPR treatment, sizing of engineered storage, and techniques for demonstrating safety of DPR product water.

CUWA AGENCIES ARE SUPPORTING RESEARCH TO EVALUATE POTABLE REUSE AS A SOLUTION TO CALIFORNIA'S WATER SUPPLY CHALLENGES.

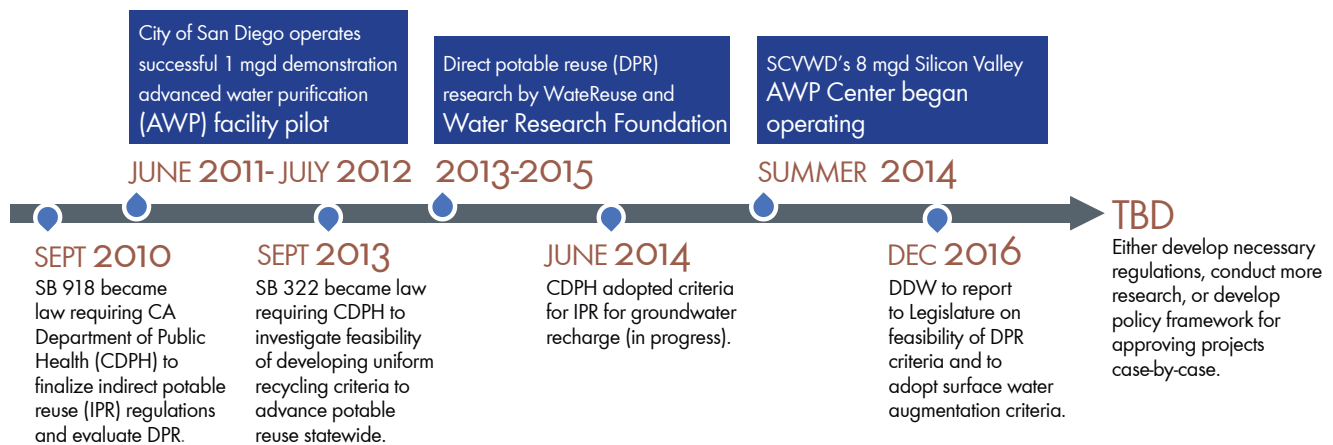


FIGURE 3 STEPS TOWARD ESTABLISHING A POTABLE REUSE REGULATORY FRAMEWORK



3.2 Engaging the Public

Customer acceptance (or support) is a critical factor in advancing water reuse, particularly as potable reuse proceeds. Public engagement has been shown to result in greater understanding and support for water reuse programs. Support for water reuse planning and diversification starts with facilitating public understanding of water reuse and influencing changes in customer behavior through education and public outreach activities. Some of the more effective stakeholder/public engagement strategies that CUWA agencies are successfully implementing include: engagement of opinion leaders and elected officials, facility tours, sustained presence at community events, obtaining written support, and conducting proactive school outreach.

For example, LADWP has been actively engaging stakeholders through the City of Los Angeles “Recycled Water Advisory Group” (RWAG), launched in 2009 along with the City’s Bureau of Sanitation, to obtain input during the development of the City’s Recycled Water Master Planning documents. Consisting of over 60 community groups, environmental organizations, businesses, academia, and public agencies, the RWAG provided critical input to the City team at critical milestones of the three-year planning process, until the Master Plan was completed in 2012. LADWP and Sanitation held numerous workshops, facility tours, surveys, webinars, and other activities to inform the RWAG’s feedback. Currently, the RWAG’s involvement is continuing beyond the planning effort into the implementation of critical recycled water projects and strategies, with particular focus on the City’s proposed Groundwater Replenishment Project. Some participants have submitted written support for the program and the GWR project, regularly provide recommendations on outreach efforts, and independently respond to local media inquiries in support of recycled water.

Effective public engagement has led to some encouraging polling data. Results from a SCVWD survey show that public support can improve quickly and dramatically once the public is informed and educated on water reuse (Figure 4). Public support can also increase with consistent engagement efforts over a longer period of time, as shown by the trend tracked by the City of San Diego for public acceptance of their program from 2004 to 2012 (Figure 5).

San Diego Regional Water Reuse

San Diego County Water Authority

To diversify its regional water supply portfolio and reduce its reliance on imported water, the SDCWA is working in conjunction with its member agencies to optimize recycled water use. Current recycled water use within the SDCWA’s service area is approximately 30,000 AFY. With research advancements, streamlined regulations, and expansion of potable reuse, this number could rise to 100,000 AFY by 2030. The SDCWA supports and advocates the development and use of recycled water regionally through the adoption of legislation and regulations permitting the safe use of NPR and potable reuse. The SDCWA has also developed outreach and technical information to increase public awareness and understanding of water recycling and IPR; promotes legislation to increase project funding; and implements and manages incentive and grant-funded programs that benefit its member agencies.

“The City should continue their commendable outreach activities with the City’s Recycled Water Advisory Group (RWAG) and extend outreach to a broader community.”

– Independent Advisory Panel for the City of Los Angeles Groundwater Replenishment Project (April 2013)

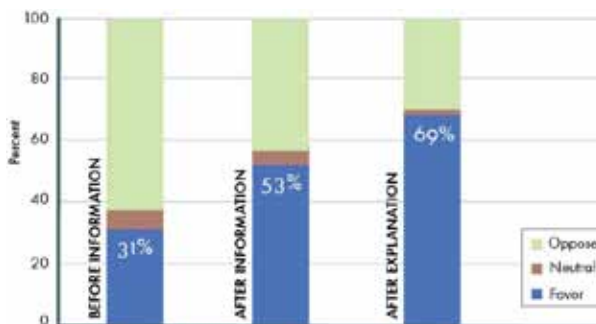


FIGURE 4. EXPLAINING REUSE MORE THAN DOUBLED PUBLIC SUPPORT (SCVWD).

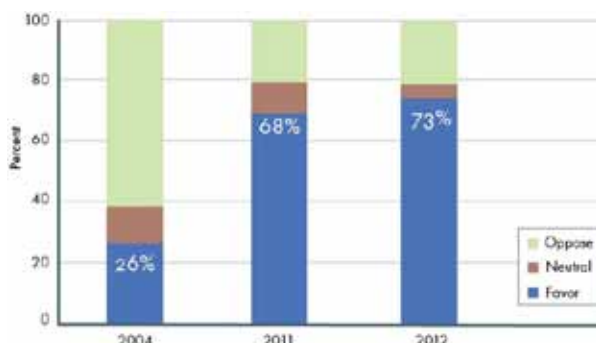


FIGURE 5. MULTI-YEAR ENGAGEMENT PROGRAM NEARLY TRIPLED CUSTOMER SUPPORT (CITY OF SAN DIEGO).

3.3 Leveraging Partnerships

Partnerships are critical for financing and implementing new water reuse projects. Many CUWA agencies have created partnerships between wholesale and retail water agencies and/or wastewater agencies; industrial users; and/or neighboring regions or districts. For example, Zone 7 was a co-permittee for their service area's original Master Water Recycling Permit. As a co-permittee, Zone 7 addressed a condition of the permit by developing one of the State's first Salt Management Plans that was approved by the San Francisco Bay Regional Water Quality Control Board in 2004.

Coordination of retail member agency efforts by wholesale agencies can streamline the level of oversight on water reuse projects and lower costs to both the agencies and water users. For example, Metropolitan Water District of Southern California (MWDSC) provides financial incentives to its retail water agencies under its Local Resources Program. By providing an incentive to its retailers, MWDSC aims to achieve a target of 580,000 AFY of potable water reductions from combined water conservation and water recycling efforts (note – incorporates the 20x2020 per capita water use reduction target).

CUWA agencies also leverage partnerships with industrial users. One example is EBMUD's partnership with a refinery to provide recycled water for cooling tower and boiler feedwater applications.



Wholesale-Retail Partnerships

Zone 7 Water Agency

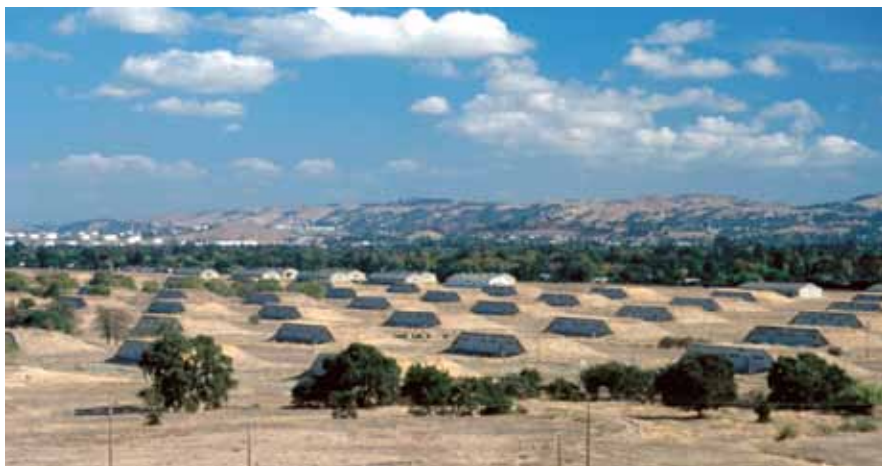
Zone 7 continues working closely with its retailers on their recycled water programs and incorporates retailer efforts into water supply planning and groundwater management efforts. For example, in partnership with Zone 7, the City of Pleasanton recently completed a feasibility study that is laying the groundwork for the City's implementation of recycled water in its service area. Zone 7 also provided financial support for the retrofit of school irrigation systems in the City of Dublin to allow for conversion to recycled water use. As the groundwater basin manager, Zone 7 is taking the lead in updating the original Salt Management Plan to account for recycling (see main body text).



Local Projects Program and Foundational Action Funding Program

Metropolitan Water District of Southern California

MWDSC's 2010 Integrated Resources Plan Update established a planning framework that helps ensure the region's water supply reliability into the future and includes a target of 580,000 AFY of combined water conservation and water recycling (incorporating the State's 20x2020 goal). To support this goal, MWDSC provides financial incentives to its retail agencies under its Local Resources Program with three payment options: sliding scale payment up to \$340/AF over 25 years, sliding scale payment up to \$475/AF over 15 years, or fixed payment up to \$305/AF over 25 years. In April 2013, MWDSC's Board approved a two-year pilot program (Foundational Action Funding Program) to provide funding for technical studies or pilot projects for local resources including IPR and DPR, as well as seawater desalination, stormwater and groundwater. MWDSC's Board also approved a three-year, \$7.5 million pilot program in May 2014 to provide funding to customers for retrofitting their potable water systems to use recycled water.



Concord Naval Weapons Station Redevelopment

Contra Costa Water District

Approximately 10 percent of CCWD's current water demands are met with recycled water including uses for industrial, irrigation, and fish and wildlife enhancement. In the future, the Concord Naval Weapons Station redevelopment presents the most significant opportunity for well-designed, fully integrated, and cost-effective recycled water use within CCWD's service area. The project involves redeveloping approximately 5,000 acres into approximately 12,000 residential units and 6 million square feet of commercial and retail uses. CCWD worked with the City of Concord and the Central Contra Costa Sanitary District throughout the planning process to incorporate significant water conservation measures, low water demand development and recycled water standards that reduce the potable demand projections by more than 50 percent. The proposed project will use recycled water in an amount equal to or greater than the net potable water demand.

Conclusion – Beyond 2030

Water reuse is a resilient, local, relatively drought-resistant option for meeting future demands. As part of their commitment to water use efficiency and water supply reliability, CUWA agencies are helping to advance water reuse to make a significant contribution toward the State's water reuse goals.

As part of their broader support of the State of California's continuing efforts to meet future water demands with reliable and sustainable supplies, CUWA agencies have been working to advance water reuse in the State of California since 1980.

As documented in their collective UWMPs, CUWA agencies have committed projects to achieve actual water reuse of at least 600,000 AFY by the year 2030, doubling the water reuse in 2010.

Beyond those commitments, CUWA agencies have significantly more expansive conceptual plans for water reuse, including potable reuse and other innovative approaches highlighted in this Water Reuse Update. Although successful implementation of water reuse on a broader scale in the future is highly dependent on a number of factors (e.g., regulations, economics, and public support among others), CUWA agencies could collectively achieve levels of water reuse nearing 1,000,000 AFY or beyond. In the meantime, the agencies are working hard to advance viable regulatory frameworks and public education for water reuse in California to provide reliable and sustainable supplies that meet future water demands and continue to protect public health.



Established in 1990, the California Urban Water Agencies (CUWA) is a non-profit corporation of 10 major urban water agencies that collectively deliver drinking water to approximately two-thirds of California's population. CUWA's mission is to work together to promote reliable, high-quality water supplies for the State's current and future urban water needs in a cost-effective manner for the public, the environment, and the economy.

Approximately 69% of the state's population resides within the areas served by **CUWA member agencies**



Population Served 26 million (in 2013)

Retail Agencies:

- Alameda County Water District (ACWD) www.acwd.org
- East Bay Municipal Utility District (EBMUD) www.ebmud.com
- Los Angeles Department of Water and Power (LADWP) www.ladwp.com

Retail/Wholesale Agencies:

- Contra Costa Water District (CCWD) www.ccwater.com
- City of San Diego Public Utilities Department (San Diego) www.sandiego.gov/publicutilities
- San Francisco Public Utilities Commission (SFPUC) www.sfwater.org

Wholesale Agencies

- Metropolitan Water District of Southern California (MWDSC) www.mwdh2o.com
- Santa Clara Valley Water District (SCVWD) www.valleywater.org
- San Diego County Water Authority (SDCWA) www.sdcwa.org
- Zone 7 Water Agency (Zone 7) www.zone7water.com

For more information visit www.CUWA.org