

STATE OF CALIFORNIA
REGIONAL WATER QUALITY CONTROL BOARD SAN
FRANCISCO BAY REGION

STAFF SUMMARY REPORT (Margaret Monahan
and Melissa Gunter)
MEETING DATE: September 9, 2020

ITEM: 7

SUBJECT: **Recycled Water in the San Francisco Bay Region** – Information Item

DISCUSSION: This item summarizes the status of recycled water production and use, and our regulatory oversight over those, in the San Francisco Bay Region. Recycled water is a reliable alternative water supply that can help California communities become more resilient in the face of climate uncertainty, particularly by increasing the long-term reliability and sustainability of water supply sources.

Recycled water is treated wastewater that is productively reused. The term typically has been applied to domestic wastewater treated via centralized publicly owned treatment facilities that is distributed via purple pipe. Demand for and acceptance of recycled water are expanding and now also include decentralized, onsite non-potable water treatment and reuse, along with the recycling of wastewater that does not include domestic wastewater.

Recycled water production and use have been increasing regionally, from about 30,000 acre-feet per year in 2001 to 64,000 acre-feet per year in 2019. This is about nine percent of the total recycled water use statewide. The largest quantity of regionally recycled water used in 2019 was for industrial applications, followed by landscape and golf course irrigation. Onsite reuse of graywater, rainwater, and stormwater is also increasing, but remains a small percentage of the total recycled water use.

The State Water Resources Control Board (State Water Board) adopted an amendment to the Water Quality Control Policy for Recycled Water ([Recycled Water Policy](#)) on December 11, 2018 (effective on April 8, 2019). The amendment includes numeric goals for the use of recycled water, two narrative goals to encourage recycled water use in groundwater-overdrafted and coastal areas, and statewide requirements to report annually on the volume of recycled water produced.

We are implementing the actions necessary to achieve the Policy goals, with our current focus being the transition of existing recycled water programs from a regional order to the State Water Board's [Water Reclamation Requirements for Recycled Water Use](#) (Statewide General Order) for recycled water uses to provide statewide consistency. Over the past year, we worked collaboratively with our recycled water permittees to transition 22 of the programs to the Statewide General Order in April 2020. In addition to the Statewide General Order, the State Water Board's General Waste Discharge Requirements for Small Domestic Wastewater

Treatment Systems provide regulatory coverage for recycled water projects under certain conditions.

Using the above tools, we are working to permit several innovative recycled water projects, including onsite recycled water projects at technology company office campuses, which will combine domestic wastewater with harvested rainwater for treatment and reuse to flush fixtures and for irrigation.

The following sections provide: background information; a summary of recycled water production volumes and uses in our region; a discussion of the Recycled Water Policy; implementation actions our Region is taking; and perspectives on the future of recycled water, highlighting both innovative recycled water projects and challenges associated with increasing and expanding recycled water use.

Background

Recycled water is wastewater that has undergone treatment so that it can be reused for other purposes. Title 22 of the California Code of Regulations (CCR) (Title 22) has the primary regulations that govern the production and use of recycled water from municipal or domestic sources, with the allowable use based on the level of treatment. The lower level of treatment results in “undisinfected secondary” quality, which can be used for flushing sanitary sewers, and the more advanced “disinfected tertiary” quality, which may be used for uses including toilet flushing and irrigating residential landscaping. This information item is focused on recycled water from municipal sources, but we also touch on other forms of water recycling, such as onsite reuse of alternate water sources such as greywater (wastewater generated from showers and sinks, excluding domestic sewage), rainwater, and industrial process water.

Recycled water is an important component of building California’s water resilience. The [Water Resilience Portfolio Report](#) developed by several state agencies in response to Governor Newsom’s Executive Order N-10-19 states that climate change will increase water supply challenges throughout the state. The State Water Board recognizes that recycled water is a reliable alternative water supply that can assist California communities in becoming more resilient in the face of climate uncertainty. Many of the actions the State Water Board and regional water boards are taking in implementing the Recycled Water Policy and permitting recycled water projects work to fulfill the Water Resilience Portfolio goals, including:

- Secure sustainable groundwater supplies by supporting sustainable use;
- Preserve groundwater basin quality to enable large-scale water recycling;
- Recycle at least 2.5 million acre-feet per year in the next decade;
- Support statewide source control programs for constituents of emerging concern;
- Modernize water data systems; and
- Help regions prepare for inevitable drought

San Francisco has been a leader in water recycling since the completion in 1932 of the first recycled water treatment plant in California, the McQueen Treatment

Plant near Golden Gate Park. The Bay Area has a long history of regional recycled water planning. In the early 1990s, following years of drought and facing uncertain future water supplies, Bay Area wastewater and water public utilities formed a partnership with the United States Bureau of Water Reclamation and the California Department of Water Resources to study the feasibility of a regional approach to water recycling. Similarly, water supply and clean water agencies throughout the North Bay counties of Marin, Sonoma, and Napa have been meeting since the early 2000s to investigate opportunities to expand the use of recycled water for agricultural and other purposes.¹ In 1996, the Board adopted General Water Reuse Requirements Order R2-1996-011 (Regional General Order) to serve as a region-wide general permit for publicly owned wastewater and water agencies that recycle municipal wastewater. The Regional General Order streamlined the permitting process, supported local water reuse programs, and served as a model for the Statewide General Order.

The success of the recycled water program in our Region is due in significant part to the collaborative relationship between the recycled water entities and the Regional Water Board. Working partnerships include the Bay Area Clean Water Agencies (BACWA), a joint powers agency formed by wastewater treatment agencies in the Region. We engage with their recycled water committee to communicate about municipal wastewater community issues and recycled water projects, and to build regional collaboration. With no budgeted staff resources for recycled water permitting and oversight, we depend on those collaborative relationships to facilitate the program's development and implementation.

Recycled Water Production and Uses

The Water Resilience Portfolio Report and the Recycled Water Policy set a goal of increasing recycled water use in California to at least 2.5 million acre-feet per year by 2030. To evaluate current statewide recycled water use and opportunity, the Policy requires annual volumetric reporting of wastewater and recycled water. The first volumetric reports, for 2019, were submitted in June 2020.

In July 2019, the State Water Board issued an order to update recycled water monitoring and reporting programs to implement the Recycled Water Policy monitoring requirements statewide. The Order requires wastewater treatment plants and recycled water producers to electronically submit annual reports of volumetric data for influent (what is coming into the treatment plant), effluent produced (volume of wastewater treated), effluent discharged (where is the water going), and recycled water used.

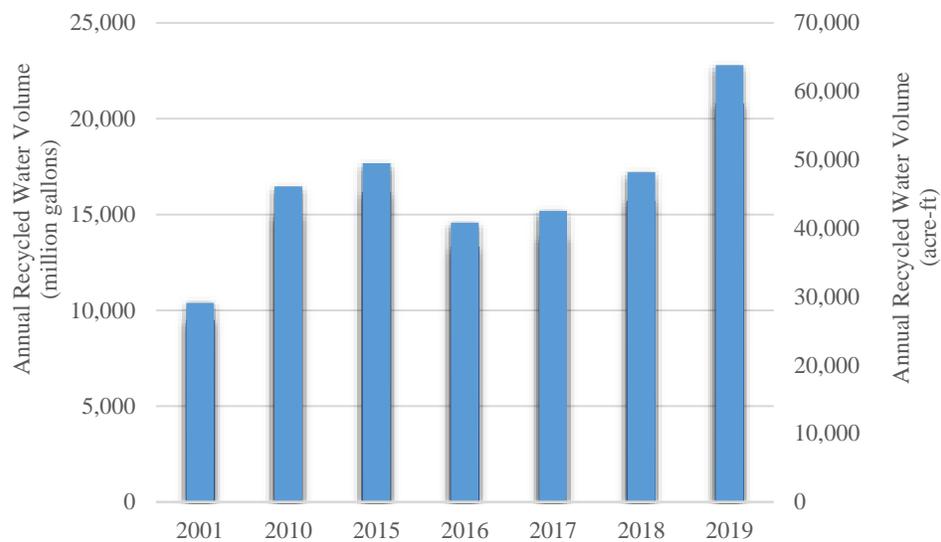
Based upon the 2019 data submitted to date, Bay Area wastewater treatment plants are recycling approximately five percent of their effluent. Treatment plants generated approximately 1.2 million acre-feet (AF) or (392,103 million gallons)

¹ Bay Area Clean Water Agencies. "Bay Area Integrated Regional Water Management Plan – Wastewater and Recycled Water Functional Area Document." March 3, 2006. <https://bacwa.org/wp-content/uploads/2007/09/10385-Water-Recycling-IRWMP-3-3-06.pdf>

and recycled 63,809 AF (20,792 million gallons).² Statewide, the reported volumes of effluent and produced recycled water for 2019 were 187 million AF, and approximately 697,358 AF, respectively, a recycling rate of about 3.7 percent.

The Recycled Water Policy stipulates twelve recycled water use categories, including agricultural irrigation, industrial applications (e.g., cooling towers and process water), and other non-potable uses (e.g., dust control, sewer flushing, and fill stations). Prior to electronic reporting, recycled water data were collected via surveys and permittee-submitted annual reports and thus, the recycled water use categories varied. Further data analysis will be conducted to understand differences in the data sets and changes over time. The estimated volumes of recycled water produced in the Region have generally increased over time (Fig. 1).

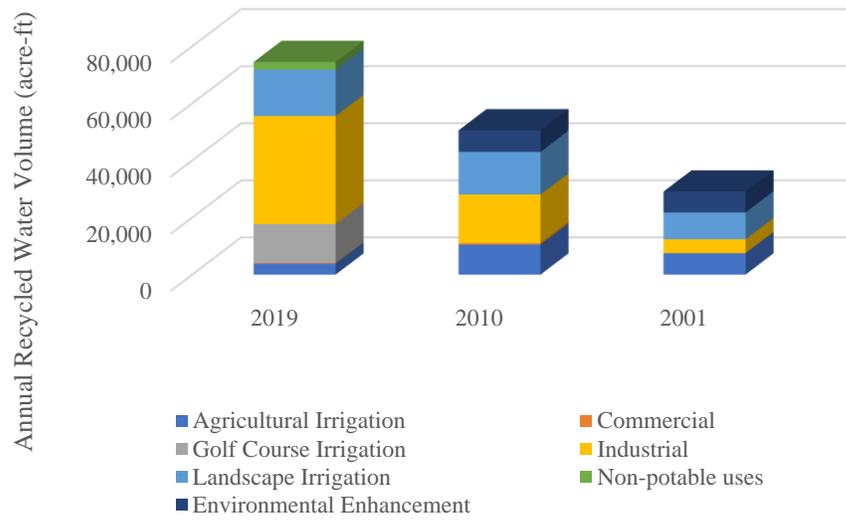
Figure 1: **Recycled Water in San Francisco Bay Region**



Recycled water production volumes per use category in the Region are depicted in Figure 2. The largest quantity of regionally recycled water used in 2019 was for industrial applications, which is also the use with the greatest volume increase between 2010 and 2019, followed by landscape and golf course irrigation. The environmental enhancement use that appears in 2001 and 2010 was not a reportable category in 2019, and thus does not appear since the use has been recategorized, although the uses are continuing. It typically includes natural system restoration, wetland/marsh applications, and wildlife habitat such as a duck pond served by the City of Palo Alto.

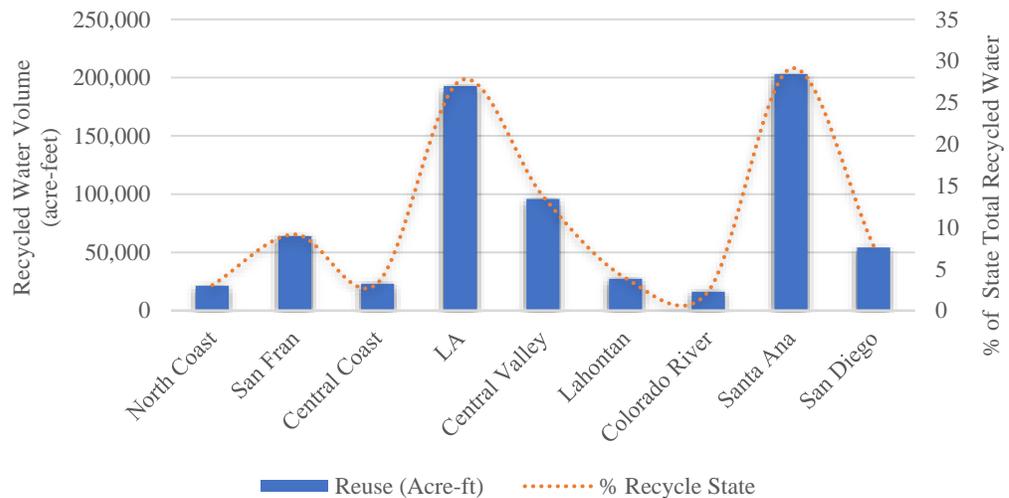
² The reported recycled water volumes are not final since approximately thirteen percent of the permittees statewide have not completed their electronic volumetric reporting in GeoTracker ESI (Electronic Submittal of Information).

Figure 2: San Francisco Bay Region Annual Recycled Water Volumes by Use



The reported 2019 recycled water volumes were also compared across the regional boards and to the total statewide volume (Fig. 3). The largest volumes of recycled water were produced in the Santa Ana and Los Angeles regions, collectively contributing to approximately 57% of recycled water produced in the state.

Figure 3: Regional Water Board 2019 Recycled Water Volumes



Recycled Water Policy and Transition of Permittees to the Statewide Recycled Water General Order

The Recycled Water Policy was first adopted by the State Water Board in 2009 to encourage the safe use of recycled water, to set goals for streamlining permitting, and to investigate constituents of emerging concern. The State Water Board adopted an amendment to the Recycled Water Policy on December 11, 2018

(effective on April 8, 2019), to address advancements in recycled water and regulatory developments, such as the Sustainable Groundwater Management Act and potable reuse regulations. The Policy amendment includes numeric recycled water use goals, and provisions for improvements to the tracking and reporting of recycled water production and for the promotion of basin-wide management of salts and nutrients in groundwater. One of the Policy's implementation actions is to improve recycled water permit consistency, to allow more efficient planning by recycled water programs and more efficient permitting by the Water Boards. To improve consistency, the State Water Board adopted the 2016 Statewide General Order, which was modeled after our Region's 1996 Regional General Order. The Statewide General Order conditionally delegates authority to the recycled water permittees, such as a municipality, who can then manage their own water recycling program for their city or service area and issue water recycling permits to users within their program. This provides a streamlined permitting pathway for non-potable recycled water projects and is intended to expand non-potable reuse statewide. The Recycled Water Policy amendment set requirements for the regional boards to transition existing recycled water programs to the State General Order for statewide consistency.

In our Region, there are 49 recycled water projects or programs under Water Reclamation Requirements (WRRs) and additional projects that recycle onsite under Waste Discharge Requirements (WDRs). In accordance with the Recycled Water Policy, we worked collaboratively with our permittees under the Regional General Order to transition 22 of the programs to the State General Order in April 2020. We minimized staff administrative work in transitioning the permittees to the State General Order by implementing a streamlined process and issuing one Notice of Applicability and Monitoring and Reporting Program for all permittees. We collaborated with the permittees throughout the process to keep them informed as well as receive their input on proposed changes as compared to the Regional General Order.

The next steps in our permitting process include transitioning another four permittees under the Regional General Order, once their recycled water engineering reports have been updated and approved. The remaining recycled water permittees, who are enrolled under individual WRRs, will be assessed and transitioned to the Statewide General Order on a case-by-case basis as appropriate. We will consider additional streamlining opportunities in permitting, such as for single entities that currently have more than one recycled water permit. Following the transition of all the recycled water permittees from the Regional General Order to the Statewide General Order, we will ask the Board to consider rescinding the Regional General Order.

Another implementation action of the Recycled Water Policy is for each Regional Water Board to evaluate its region's groundwater basins for salt and nutrient threats by April 2021. The evaluation will result in the identification of basins, through a resolution or executive officer determination, where salt and nutrient management planning is needed to achieve water quality objectives in the long term.

Future of Recycled Water

To help address the need for a statewide strategy to improve water supply resilience and advance water reuse statewide over the next 30 years, in 2019 WateReuse California³ developed the [California WateReuse Action Plan](#).

Several of the Action Plan's proposed actions are related to recycled water regulations and call on the State Water Board to develop statewide regulations for raw water augmentation and onsite reuse, and to update existing non-potable recycled water regulations. [Assembly Bill 574 \(Quirk 2017\)](#) established a 2023 legislative deadline for the development of statewide regulations for raw water augmentation. AB 574 requires that the State Water Board develop the regulations with the advice of an expert panel. [Senate Bill 966 \(Wiener 2018\)](#) requires the State Water Board to adopt regulations for risk-based water quality standards for the onsite treatment and reuse for non-potable end uses in multifamily residential, commercial, and mixed-use buildings by December 2022. This will enable and authorize local communities to establish their own onsite water recycling programs, providing guidance and predictability in designing, permitting, installing, and operating onsite systems. SB 966 was sponsored by the San Francisco Public Utilities Commission (SFPUC).

SFPUC has contributed to the development of a risk-based pathogen reduction framework and has incorporated it into their Non-potable Water Program, which provides a permitting process for the collection, treatment, and reuse of alternate water sources for non-potable uses. To support collaboration with permitting recycled water projects, the Regional Board adopted [Water Reclamation Requirements for the City and County of San Francisco's Non-Potable Water Program](#) in 2017.

The WateReuse Action Plan calls for the State Water Board to update Title 22 water recycling criteria and use requirements for all non-potable recycled water projects in the state. These regulations have not been updated in nearly 20 years and contain a number of outdated and overly prescriptive requirements for non-potable recycled water use that are not needed for the protection of public health or the environment. Maintaining outdated regulatory requirements deters the development of new non-potable recycled water uses and increases operating costs for existing recycled water projects.

Within our region, we strive to provide scale-appropriate, protective regulatory approaches to permitting and the development of water quality monitoring criteria to support the proliferation of recycled water. This is supported by referencing and incorporating findings and guidance into our permitting efforts resulting from research conducted by trusted, informed, and educated sources. Examples include

³ WateReuse California is a state section of the WateReuse Association with the mission to promote responsible stewardship of California's water resources by maximizing the safe, practical, and beneficial use of recycled water and by supporting the efforts of the of WateReuse Association. The WateReuse Association was founded by water leaders in California thirty years ago and is the nation's only trade association solely dedicated to advancing laws, policy, funding, and public acceptance of recycled water. WateReuse represents a coalition of utilities that recycle water, businesses that support the development of recycled water projects, and consumers of recycled water.

addressing the risk-based pathogen log reduction framework supported by SB 966 through permit conditions and monitoring requirements. In 2019, we applied a flexible yet protective permitting approach to the use of secondary treated effluent at the [Bel Marin Keys](#) interagency, multi-benefit wetland restoration project for soil conditioning and compaction, dust control, and plant irrigation. Our overarching approach to recycled water projects is to align with Title 22 water recycling criteria while collaboratively providing flexibility when there is no threat to public health.

Our region is also requiring all major municipal wastewater dischargers in the Region to evaluate water recycling opportunities as part of the [NPDES Nutrients Watershed Permit](#) as a potential option to reduce the nutrient load of wastewater discharged to the Bay. This will inform the regulatory and the wastewater community of the extent that dischargers may be able to reduce nutrient loads while providing additional environmental and societal benefits through water recycling (e.g., reduced natural water resource diversion, reduced demand for potable water). The Nutrients Watershed Permit requires the submittal of a Recycled Water Scoping and Evaluation Plan (submitted November 2019) and a Final Report describing the results of the evaluation and implementation by July 2023. BACWA is also involved with developing and reviewing these plans.

Innovative Recycled Water Project Highlights

Advanced purified water projects, aimed at producing potable (drinking) water, are in the planning stages throughout the Region and include the 2014 commencement of the operation of the Santa Clara Valley Water District's (Valley Water's) [Silicon Valley Advanced Water Purification Center](#). Valley Water's goal is to develop recycled water to provide for at least 10 percent of the total county water demands by 2025. SFPUC is involved through its [PureWaterSF](#) project, which is a research project that explores how to treat and reliably produce purified water on a building scale using wastewater generated onsite to meet or exceed drinking water standards.

New municipal scale recycled water projects in the Region include [SFPUC's Westside Recycled Water Project](#) and the [West Bay Sanitary District's](#) Sharon Heights Recycled Water Facility. SFPUC's Westside project will retrofit the existing Oceanside wastewater treatment plant to provide recycled water to Golden Gate Park and the Lincoln Park Golf Course. The Sharon Heights recycled water project, by contrast, is a satellite treatment facility that redirects and treats wastewater from the sanitary sewer collection system for recycled water uses of golf course irrigation and a Caltrans truck fill station, and discharges the solids back into the sanitary sewer collection system for treatment at a different facility.

Another innovative recycled water treatment project is the upgraded City of Petaluma's [Ellis Creek Water Recycling Facility](#), which blends leading-edge treatment technologies with natural processes. A component of the wastewater treatment process is polishing wetlands, which use natural treatment processes to remove nutrients and metals from the wastewater.

Finally, the Microsoft Silicon Valley and Google Bay View office campuses are combining domestic wastewater with harvested rainwater for treatment and reuse on campus for flushing fixtures and irrigation. The Microsoft and Google Bay View projects also include low impact development designs for stormwater management. Two additional projects, by Facebook and at Google's Charleston East campus, integrate smaller, decentralized, onsite water systems into the larger centralized systems by collecting and treating water onsite to serve non-potable needs, thus reducing the demand for potable water for those needs.

Challenges

California has ambitious goals for recycled water use, but there are numerous challenges with increasing the use of recycled water that we must continue to work to overcome. First are monetary challenges in the form of infrastructure investments and treatment upgrades. In some areas, recycled water project infrastructure investments are not yet economically viable when compared to other sources of water.

It also remains challenging for prospective recyclers to navigate the several agencies involved in recycled water regulations and permitting. This is being improved for non-potable reuse projects by transitioning existing and enrolling new recyclers in the Statewide General Order, as described above. However, projects still face regulatory uncertainty in areas such as onsite reuse of non-potable water and direct potable reuse.

Technical challenges can also make it difficult to use recycled water. For example, reverse osmosis, a form of treatment technology used to filter water for high quality reuse, produces a concentrated brine, which has disposal impediments. Elevated total dissolved solids in recycled water can be an impediment to using it for irrigation. There are data gaps and research needed to verify the efficacy of new treatment technologies, improve monitoring for pathogens, identify and manage constituents of emerging concern (CECs), and optimize pollutant source control. Finally, despite decades of what is essentially potable reuse of recycled wastewater by communities along river systems (e.g., along the Colorado), public perception remains a significant challenge to the potable use of recycled water, which continues to be addressed through the WateReuse Communications Collaborative Group framework and terminology for discussing water reuse with the public.

The Water Boards are working to address many of these challenges. The State Water Board Division of Financial Assistance is working to fund recycled water projects. For example, the SFPUC's Westside and West Bay Sanitary District's recycled water projects received funding from the [Clean Water State Revolving Fund](#) administered by the State Water Board. The updates to the Recycled Water Policy and concerted efforts to implement the Policy actions, as well as ongoing recycled water research funded by the State Water Board, are addressing some of the challenges.

In addition to the Recycled Water Policy actions discussed above, the Policy includes updated monitoring requirements for CECs, as well as two bioanalytical

screening tools to evaluate bioactivity in recycled water resulting from estrogenic and dioxin-like constituents, based on the recommendations of the most recent [Science Advisory Panel for CECs in Recycled Water](#). Our Region is currently leading a statewide CECs project to synthesize and evaluate the significance of available CECs water quality data including ambient data (water, sediment, and aquatic biota in river, stream, estuary, bay, and marine waters), as well as pathways data (wastewater, stormwater, and recycled water), and to identify priorities for management and monitoring. The [Aquatic Science Center](#) is conducting the synthesis in collaboration with the Water Boards' CECs Initiative Team and stakeholders, thereby building on the knowledge base from our San Francisco Bay [Regional Monitoring Program Emerging Contaminants Workgroup](#).

Finally, Regional Water Board staff continue to stay engaged in recycled water discussions with stakeholders. We recently participated in a focus group of thought leaders connected to onsite non-potable water projects and programs to identify institutional, regulatory, and social challenges with implementing onsite urban water management technologies and reuse. The research effort will result in a report that addresses novel ways for overcoming the challenges, create new strategic options for utilities, and provide policy advice.

Summary

Water recycling enhances the sustainability and effective use of water resources and is a reliable and environmentally sensitive means to expand California's available water resources and reduce the demand on freshwater systems. Recycled water production and use have increased over time in our Region and there are several innovative recycled water projects and long-term initiatives currently under way. Regional efforts are under way to identify opportunities to increase recycled water use from the current five percent of the Region's effluent that is currently being recycled.

We are working diligently to implement the actions necessary to achieve the Recycled Water Policy goals. Despite the challenges associated with increasing recycled water use, numerous efforts are being made to overcome those challenges, from development of new recycled water regulations to recycled water research efforts.

RECOMMEN- DATION:

No action needed; information item