SUMMARY WHITE PAPER: WATER REUSE 101



OVERVIEW & CONTEXT

In March 2021, the WateReuse Association convened the virtual 36th Annual WateReuse Symposium, which included eight live roundtable discussions with facilitated breakout sessions. Led by WateReuse members and Champion sponsors, the live roundtables were presented in a format that allowed both knowledge sharing and interaction between participants. First, a group of six to ten experts participated in a web-based video panel discussion viewed by several hundred attendees. When the live roundtable discussion concluded, the attendees moved into one of six pre-selected breakout sessions. Each breakout session focused on one aspect of the broader live roundtable discussion. WateReuse member volunteers facilitated the breakout dialogs, with one taking notes that were later used to produce this series of summary white papers.

This paper summarizes the discussions held during the 36th WateReuse Symposium Water Reuse 101 roundtable.

LIVE ROUNDTABLE SUMMARY

The Water Reuse 101 live roundtable brought together experienced practitioners and researchers to discuss current water reuse practices, regulations, and research. The panelists began with an exchange on the drivers for their local projects, highlighting that no water reuse journey is the same. In Los Angeles, the city made water reuse a central feature of its 2035 water plan to address dependence on imported water and water stress brought on by climate change. Los Angeles plans to purify enough recycled water to provide potable water for nearly one third of its residents. In Florida, population growth and water demand began to outpace the available resources pushing communities to explore alternative water supplies. For the Hampton Roads Sanitation District (HRSD) in Virginia, nutrient discharge regulations meant the utility needed to get creative on how to meet long-term regulatory requirements. The town of Bartlesville, Oklahoma faced pressures on water resources due to drought, as well as a legislative directive to cap freshwater use at 2012 levels through 2060 to incentivize the use of alternative water supplies.

SPEAKERS

- HUUB COX, Division Manager of Water Recycling Implementation Division, LA Sanitation and Environment, California
- TERRY LAURITSEN, Engineering and Water Utilities Director, City of Bartlesville, Oklahoma
- MELISSA MEEKER, Chief Executive Officer, The Water Tower, Georgia
- TRACY LEWIS, Global Practice Leader for Wastewater, Tetra Tech (Moderator)
- KRISHNA PAGILLA, Professor/Chair, Environmental and Civil Engineering Dept at University of Nevada, Reno
- BART WEISS, Chief Officer of Innovation and Resiliency, Hillsborough County Public Utilities, Florida
- LAUREN ZURAVNSKY, Chief of Design & Construction— SWIFT, Hampton Roads Sanitation District, Virginia



For each project's success, evaluating new technologies and working with regulators were essential components of the story. HRSD established an internal research and development office, which allows the utility to develop pilot studies to demonstrate that new treatment technologies can produce water that meets regulatory standards. When selecting treatment equipment, HRSD set up a side-by-side pilot comparison of reverse osmosis and ultrafiltration systems. The demonstration projects helped HRSD gain regulatory support for an innovative project to recharge the regional aquifer with recycled water. Similarly, Hillsborough County, Florida aims to infuse innovation into the utility culture, using a technical approval committee to review design applications and provide leadership on identifying innovative solutions.

On the research front, the greatest success comes from a seamless integration of utilities, industry, regulators, and universities. In partnership with local utilities, the University of Arizona studies alternatives to reverse osmosis treatment, such as Granular Activated Carbon systems, to remove contaminants of emerging concern like PFAS. While reverse osmosis is an effective treatment technology, it produces a brine that can be challenging to dispose of for inland communities. Innovation hubs like the Water Tower in Georgia provide a space for diverse stakeholders to come together and demonstrate technology advancements and effectiveness.

The panel concluded by emphasizing the key role of public outreach and education in every water reuse project regardless of geography and driver. The key to successful public outreach and education is beginning early and conducting outreach often. In Florida, local brewers were invited to brew beer using water from a direct potable reuse pilot facility, providing an opportunity to educate the public ahead of the development of the Hillsborough reuse project. HRSD held multiple public hearings to educate, as well as listen to concerns. HRSD even workshopped the name of its water reuse program, engaging the public to help select "Sustainable Water Innovation for Tomorrow (SWIFT)." Bartlesville engaged its regulators in outreach early to advance a water reuse initiative that was on the cutting edge in Oklahoma.



BREAKOUT DISCUSSIONS TAKEAWAYS

Echoing the themes of the roundtable, the six breakout rooms discussed indirect potable reuse (IPR) and direct potable reuse (DPR) regulations, public education, funding opportunities, operator training certification, enhanced recovery, and innovative technologies. Breakout discussions included 129 participants, with anywhere from 7 to 27 attendees in each room.

BREAKOUT ROOM 1 IPR AND DPR REGULATIONS

This breakout began with an acknowledgment that regulations and definitions for water reuse vary widely across the country, highlighting the importance of working side-by-side with regulators in each state as one-size-fits-all will not work. In California, for example, regulators are open and involved in establishing water reuse projects that follow descriptive treatment processes, while Florida regulators are interested in establishing flexibility in treatment schemes. Essential in each region of the country is establishing a public education and outreach program. In Athens, Georgia, the city held public workshops for two to three years before implementing its water reuse program. The Florida Department of Environmental protection undertook a public perception survey on direct potable reuse to understand where education efforts would be the most impactful.

BREAKOUT ROOM 2 PUBLIC EDUCATION

Participants focused on the public education theme of the plenary panel, speaking to the need to effectively communicate the benefits and safety of water recycling using simple, non-technical language. Practitioners shared lessons such as using demonstration projects alongside public education to slowly build trust, surveying the public before and after outreach efforts, engaging the medical community as trusted messengers, and using existing water reuse public perception research as a guide. According to research data, educating young students pays dividends and utilities must often address a level of government mistrust in under-represented communities. Incorporating these types of findings in an outreach program helps ensure success. One approach that has proven to be successful in building community support in recent years is developing an outreach campaign that involves creating wine or beer using purified recycled water.

BREAKOUT ROOM 3 FUNDING OPPORTUNITIES

While securing funding is an essential component of launching a water reuse project, knowing where to find funding opportunities can be a challenge. The breakout brainstormed a list of potential funding resources, including tapping into a state's water plan or regional water management plans. There are several programs administered by the U.S. EPA that fund water recycling projects, including the clean water and drinking water State Revolving Funds, Water Infrastructure Finance and Innovation Act (WIFIA) loans, and Office of Research and Development grants. The U.S. Department of Interior's Bureau of Reclamation provides Title XVI water reuse grants in the West, while the U.S. Department of Agriculture provides funding for agricultural reuse. Another approach is working with a joint powers authority or local jurisdiction. Participants noted that the WateReuse Association posts funding opportunities in the weekly WateReuse Review newsletter, available to members.

2

BREAKOUT ROOM 4 OPERATOR TRAINING CERTIFICATION

Participants explored different approaches to water reuse operator training around the country. Operator requirements are generally set by state agencies responsible for drinking or wastewater requirements. In a few states, operators train in advanced water treatment (AWT), but most states require either drinking or wastewater certification to operate a water reuse plant. The group agreed that operators learn new technologies best through hands-on training on the actual technology making demonstration projects a powerful learning tool. The California-Nevada Section of the American Water Works Association developed an AWT Candidate handbook as a resource for other training programs.

The City of Los Angeles has set a goal to achieve 100% water recycling by 2035.



BREAKOUT ROOM 5 ENHANCED RECOVERY

This breakout debated regional drivers for enhanced recovery technology adoption, including economics, regulatory pressures, and water discharge limitations. In discussing the variety of enhanced recovery technologies available, the group felt that enhanced recovery is in a technology proliferation phase and that technologies are likely to eventually consolidate. Operator training and utility education were identified as essential steps to further enhance recovery. For example, enhanced recovery for brine management or higher total dissolved solids concentrations can be achieved through multi-stage reverse osmosis (RO), high-pressure RO, and other treatment schemes which all will need to be evaluated based on the total system recovery as a sum of its parts.

BREAKOUT ROOM 6 INNOVATIVE TECHNOLOGIES

This breakout explored the latest research topics, including integrated controls, PFAS removal, establishing microbial risk assessments to model risk impact from technologies, salinity management, and using ion exchange to expand water reuse in cooling towers and data centers. Although it can be difficult to finance pilot projects, the group agreed that pilots come with many benefits related to technology innovation. Demonstration facilities provide opportunities to integrate artificial intelligence technology into systems, to test alternative treatment solutions to meet regulatory requirements, and to train operations staff on new technologies.

Field demonstration trailers, such as this one operated by the University of Nevada, Reno, test treatment technology and inform the public.



CLOSING SUMMARY OF THE DISCUSSION

The concluding remarks weaved together the themes of geographical drivers for water reuse that can include water supply, drought, growth, nutrient limits, or aquifer depletion. Communication is paramount in every water reuse project, both internally at a utility and externally with stakeholders, the public, and regulators.

The WateReuse Association thanks Tetra Tech for sponsoring and assistance in organizing this live roundtable at the 36th Annual WateReuse Symposium.