Playing catchup—the slow and steady march of water reuse in New England
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ABSTRACT | Expansion of water reuse has been slow in the Northeast, where the foremost driver, water scarcity, has been less broadly felt than in other regions. Areas with the most critical need have led the way in adopting both the infrastructure and regulatory structures to enable the growth of this increasingly valuable water conservation practice. As states in New England establish water reuse programs and guidelines, stakeholders can learn from established programs in other regions as well as from those in the Northeast. Examples from Florida, Connecticut, and California illustrate some of the obstacles and approaches to overcome them used across the country.

KEYWORDS | Water reuse, recycled water, water reuse permitting, New England water reuse, water reuse funding, Water Reuse Action Plan

Water reuse has been formally practiced in the United States since California passed the first regulations in 1976. However, expansion has been slow, especially in the Northeast, where the foremost driver, water scarcity, has been less broadly felt than in other regions. It stands to reason that areas with the most critical need have led the way in adopting both the infrastructure and regulatory structures to enable the growth of this increasingly valuable water conservation practice.

There are no national regulations for water reuse, although EPA provided guidelines in 1995. Since then, each state must develop its own regulatory framework and determine its own allowed uses, e.g., landscape irrigation, crop irrigation, toilet flushing, groundwater recharge. As states in the Northeast establish programs and guidelines, water reuse project stakeholders can learn from other regions to guide implementation.

The number of water reuse projects has grown significantly with the strongest growth in recent years. According to the Bluefield Research April 2019 Market Insight report, U.S. Municipal Wastewater Reuse Projects Pipeline Segmentation & Analysis, 2019-2023, at the time nearly 600 water reuse projects were being developed; that did not include all the projects already online then.

Water reuse in the United States has been led by Arizona, California, Florida, and Texas. Several factors explain the differences between states, including water scarcity, state-level policy, funding availability, and historical experience.

A multi-agency federal group has taken on the task of advancing water reuse across the nation. The group’s first action was to develop the National Water Reuse Action Plan (WRAP) published in February 2020. With a set of actions “to advance the consideration of reuse to improve the security, sustainability, and resilience of our nation’s water resources, especially in the face of a changing climate” (EPA).

Some actions are as simple as compiling state policies and approaches to water reuse (Action 2.1) and establishing a water reuse champion award program for private sector companies (Action 4.4). The latest information on the WRAP’s progress can be found through quarterly updates by EPA or from the federal government’s online portal, epa.gov/waterreuse/national-water-reuse-action-plan-online-platform.

DRIVERS OF REUSE PROJECTS
The necessary drivers for successful water reuse projects are intuitive, but it is worth stating them clearly. Perhaps the most obvious driver is water scarcity stemming from limited water resources, frequent droughts or weather variability. Recycled water provides water purveyors with a reliable, drought-resistant, locally controlled supply.

The second driver is economic conditions that make water reuse attractive. A key factor is high or increasing costs for new water supplies, which can align with limited water resources, but can also arise where significant residential or industrial development is underway. Population growth may demand more water, places more pressure on water infrastructure, and increases the burden on the local water utility. Likewise, manufacturing or technology facilities require high-quality water to operate, driving up demand and putting upward pressure on water prices. Funding availability can also greatly influence the economic viability of water reuse. Often this takes the form of grants or low-interest loans to encourage reuse.

The third driver of successful reuse projects is a regulatory framework that encourages water recycling. This can include restrictions on water withdrawals, permitting limitations on effluent discharge, or a requirement to include reuse as part of water resource recovery plans. California is the leading example here, with strong policy drivers that make water reuse essential in municipal water resource planning and use.

When all three of these drivers align, the necessary and sufficient conditions for water reuse projects are in place. If only two are present, it is still possible to implement a project, but it requires a strong fourth driver to proceed. With enough political support, the absence of one of the other three drivers can be overcome. Nationally, an outcome of the WRAP (Action 1.1) is a federal policy statement that supports and encourages water reuse in watershed-scale planning. With this policy statement, the federal agencies have signaled support for the water economy.

WATER REUSE ACROSS THE UNITED STATES
There is clearly an appetite for more water reuse, but because the regulatory, historical, and financial drivers vary so much from state to state and project to project, owners must be creative in moving projects forward. Examples from Florida, California, and Connecticut illuminate some of the obstacles and approaches to overcome them used across the country.

Water Conserv II: Irrigation and Aquifer Recharge in Florida
Completed in 2022, Water Conserv II is one of the largest water reuse projects in the world that combines irrigation and aquifer recharge via rapid infiltration basins. Launched as an innovative joint water reclamation project between the city of Orlando and Orange County, Florida, Water Conserv II pushed the state to become the first water reuse project permitted by the Florida Department of Environmental Protection to irrigate crops produced for human consumption.

Water Conserv II is a useful example for project stakeholders in areas like New England where most of the drivers for reuse are in place.

The plant was designed to provide irrigation water to local orange groves. Water Conserv II was commissioned as an answer to the local water scarcity problem driven by agriculture, a growing population, and aquifer withdrawal limitations. The citrus groves provided an economic opportunity, with customers nearby willing to use reclaimed water for their crops. These drivers were bolstered by momentum at the city, county, and state levels to explore reuse.

While Florida had not established water reuse permitting prior to Water Conserv II’s construction, there were regulatory drivers that established and supported policies to develop more broadly there. At the time, Florida required the elimination of discharges to surface waters at the water resource recovery facility serving the area—a mandate that water reuse could satisfy.

Water Conserv II is a useful example for project stakeholders in areas like New England where most of the drivers for reuse are in place, but a state-level regulatory framework may not yet include these facilities. Water Conserv II paved the way for many other reuse projects in Florida and continues to provide a cost-effective, year-round supply of reclaimed water more than 30 years after it was built.
In partnership with the cities of Modesto and Turlock, Del Puerto Water District has delivered tertiary recycled water to California’s agricultural lands since 2017.

Del Puerto Water District Delivers Drought Resilient water in California’s Central Valley

While exciting advancements in potable reuse are happening in San Diego and Los Angeles, one of the largest recent non-potable recycled water projects in California came online in 2017 through a partnership of urban and agricultural needs in California’s Central Valley. The cities of Modesto and Turlock partnered with an irrigation water district, Del Puerto Water District (DPWD), to bring more than 3,000 acre-feet of water per year from recycled water to agricultural lands through the North Valley Regional Recycled Water Program (NVRWRP).

The Delta-Mendota Canal is a constructed facility, but it is also listed as a Water of the United States and subject to Clean Water Act National Pollutant Discharge Elimination System permitting.

The DPWD manages irrigation water for 45,000 acres (18,000 ha) of productive farmland parallel to a major federal canal, the Delta-Mendota Canal. Typical crops grown in the Del Puerto WD service area include tree crops such as almonds and apricots, feed crops such as oats and barley, and various others including tomatoes, broccoli, and wine grapes. Del Puerto WD has experienced major shortages, delays, and decreased reliability in the water it receives under its federal water service contract, so the need for reliable, drought-resistant, and locally controlled water was there. And with a federal issue and a multi-year California drought, a percent loan interest financing and millions of dollars in grants were available as well.

The NVRWRP appeared to have elements of all three key drivers, but there was a regulatory twist. While California has regulations covering recycled water use on food crops, the project fell outside the typical regulatory structure for recycled water. The Delta-Mendota Canal is a constructed facility, but it is also listed as a Water of the United States and subject to Clean Water Act National Pollutant Discharge Elimination System (NPDES) permitting. The project partners worked with the regional entity responsible for NPDES permitting and the U.S. Bureau of Reclamation to approve the new discharges to the Delta-Mendota Canal and the right to extract the recycled water from existing agricultural turnouts.

"The project has been an unparalleled success," said DPWD General Manager Antrea Hansen. "We crafted an approach that allowed it to be permitted despite no real precedent for this kind of project. We are now delivering recycled water to our landowners, thanks to the creativity, organization, collaborative spirit, and hard work of the entire project team."

UCconn Paves the Way for Water Reuse in Connecticut

The University of Connecticut (UCconn) continues to expand approved uses of water reuse that reflect the challenges of implementing them in states where the regulatory framework has not been established. Similar to how Water Conserve II served as a regulatory pilot program for Florida, the UCconn Reclaimed Water Facility (RWF) is driving regulatory progress with the State of Connecticut, as the university collaborates with the Connecticut Department of Energy & Environmental Protection (CTDEEP) to develop standards for water reuse in the state.

UCconn has grown rapidly since the mid-2000s, and like the other cities and counties that have had similar successes, has faced challenges to expand the campus. In turn, water demand has risen sharply affecting not only UCconn but several public schools, municipal buildings, businesses, and private residences that rely on a shared public water supply.

Two wells provide potable water for the campus. During drought conditions in 2006, the wells could not meet peak water demands. In response, the State of Connecticut and UCconn collaborated to reduce water withdrawal rates.

In 2006, UCconn began planning construction of the reclaimed water facility to reduce potable water demand and provide water for non-consumptive uses.

To meet these new reduced withdrawal rates, UCconn implemented additional conservative measures, including increased outreach to promote water conservation, sustainable design guidelines for new non-potable water users, and increased monitoring of the system. In 2009, UCconn began planning construction of the RWF to reduce potable water demand and provide water for non-consumptive uses.

Connecticut is one of the few states in the nation with no regulatory framework for water reuse, presenting a major obstacle. However, cooperation among university and state agency stakeholders has enabled the university to divert much of its wastewater to reuse.

Treated wastewater enters the RWF from the adjacent water pollution control facility (NPWPF) and receives further treatment that includes aeration, ultraviolet, and high-temperature water cooling system. The RWF is designed to produce an effluent of approximately 2,000 gallons (7,500 liters) per day, which is discharged to a campus pond.

UCconn’s RWF is a state-of-the-art facility that is designed to produce high-quality reclaimed water that is safe for public use. The facility is equipped with advanced treatment technologies and monitoring systems to ensure water quality.

The University of Connecticut (UCconn) and CTDEEP have worked together to expand approved uses and establish permitting standards for recycled water in Connecticut, creating a path for other water reuse projects.

Cooperation between UCconn and CTDEEP has enabled the university to divert much of its wastewater to reuse.
Secure funding. With its ability to provide multi-party, multi-benefit solutions, water reuse is popular with funding agencies and politicians. The Infrastructure Investment and Jobs Act provided funds specifically for water reuse—$1 billion for programs in the western United States and $8 billion for nationwide water programs that can support water recycling projects (WateReuse 2022). California is combining its Drinking Water and Clean Water State Revolving Fund programs to finance recycled water projects targeted for potable reuse. Alternative water supply funding programs, like those offered in Florida, can fund recycled water projects. Drought-resiliency grants, green infrastructure grants and bonds, and community revitalisation funds all have the potential to meet a state’s primary goals with water reuse solutions. Look for unusual opportunities. If in doubt, ask the funding program administrator to clarify what is allowed.

Collaborate with regulators. Expanding into water reuse can be uncharted territory when your state has not developed its own regulations. When starting conversations with regulators, bringing a proposed solution instead of only asking questions can help get your proposed use approved. Learn on the states that already have regulations to give your regulators vetted examples to build from. One great new tool out of the WRAP the REUSEExplorer, is an online resource for exploring reuse regulations by state and by proposed end use. Available on the internet, this tool can give you a place to start to understand your own state regulations and other examples you can use to initiate conversations with local regulators (see the water reuse section of epa.gov for more information).

CONCLUSION
While many states have not yet established clear roadmaps for water reuse projects, where there is a will, there is a way. Every water reuse facility that exists today began as a water scarcity or efficient management issue. As referenced in the WRAP, water utilities and private stakeholders across the United States can expect water scarcity to be an increasingly prevalent driver due to climate change—a factor that will likely introduce greater economic benefit to recycling water. Meanwhile, greater adoption of this technology and initiatives like the WRAP will help to fulfill the third driver—a supporting regulatory framework. Just as non-potable reuse has grown over recent decades, many areas that have installed non-potable systems are now looking to potable reuse as a method to conserve water resources. California, Arizona, Florida, Colorado, and Texas are developing regulations for direct potable reuse to meet the ever-growing demand while many areas of the country are starting to experience water scarcity leading to the creation or expansion of reuse projects in places like Georgia, Oklahoma, Nevada, and New Mexico. Fortunately, water scarcity is still a distant threat for most of the Northeast. As potable and non-potable water reuse technology funding, and regulations progress, New England will continue to benefit from the path laid by those in other climates.

REFERENCES

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