Workforce

THE CHALLENGE

From pipelayers and engineers to accountants and scientists, the treatment and delivery of clean water is backed by a robust and resilient workforce. The water sector offers more than 200 distinct jobs—representing up to two percent of the employment in our nation's cities (Kane and Tomer 2018). This body of workers not only enables the success of each water employer, but also carries out essential roles that uphold the health and wellbeing of thriving communities.

However, recent decades have ushered in a number of factors that are challenging the ability to sustain this vital resource. As a large portion of water sector employees nears retirement, utilities are grappling with how to preserve institutional knowledge as well as to recruit and retain new talent. And as new technology and automation are increasingly adopted, the industry must also find ways to adapt to keep pace. Utilities must develop innovative strategies to maintain a steady pipeline of skilled water workers, while at the same time ensuring the high safety standards that protect employees remain intact.

THE RESEARCH

Since the early 1990s, when issues of water sector workforce management and longevity first came to the forefront, WRF has been leading the way in research to address these challenges. *Meeting the Management, Organizational, and Staffing Challenges of the 1990s* (705), released in 1994, took one of the first in-depth looks at this area, pinpointing principal challenges and establishing a foundation for strategies to cope with a continuously changing utility work environment. Since that time, WRF has published nearly 30 additional research projects, with 11 being released in the last 10 years.

Because this issue has broad implications, spanning areas of health, economy, and public policy, WRF has collaborated strategically with a variety of global and domestic organizations. Through partnerships with the U.S. Environmental Protection Agency (EPA), the Energy Research and Development Administration, Brookings, the

FUTURE LABOR MARKET SHIFTS

AUTOMATION routine and manual tasks are increasingly automated	Redistributes workers to non-routine, interpersonal, and analytical jobs
FREELANCING larger percentage of workforce is self-employed	Provides contingent, on-demand workers with deep, specialized technical skills
PACE OF INNOVATION new technology is developed and adopted faster than ever	Requires continuous worker training to keep pace with evolving technology
NEW GENERATION millennials expected to make up 76% of global workforce by 2025	Creates workforce with increased digital expertise and technology interest, but different expectations

Source: Adapted from Accenture 2016

Water Services Association of Australia, UK Water Industry Research (UKWIR), New York State Energy Research and Development Authority, American Water Works Association, and Baywork (Bay Area Water/Wastewater Workforce Reliability) WRF has built a body of research that supports a strong, capable workforce. Research has focused on business continuity, knowledge management, employee and leadership development through succession planning, and managing the employee life cycle, as well as maintaining an environment that promotes the health and safety of all workers.

Business Continuity and Resilience

The biggest test of any workforce is the ability to maintain consistent day-to-day operations—financially, managerially, and functionally—especially after a significant disruption. While incidents such as the COVID-19 pandemic have raised both the awareness and importance of this need, WRF has a history of providing guidance to help the water sector maintain reliable service.

Released in 2013, *Business Continuity Plans for Water Utilities* (4319) remains a key resource that walks facilities through developing operational strategies for unplanned events. A corresponding template and series of training videos help users customize plans based on their specific needs, as well as to create a business case for initiating plan development.

Knowledge Management

Knowledge is central to water utility success. An understanding of processes, technologies, resources, and regulations can drive efficiency—making it easier to make decisions, comply with regulations, and initiate innovation. But, as factors like high retirement rates, new technologies, and unanticipated events threaten this resource and create knowledge gaps, the water sector must find ways to protect and preserve institutional knowledge—as well as document new processes. WRF has a body of research to assist in managing this information—helping utilities identify, capture, and store experience and data so it remains an integrated part of an organization.

Organizational Development for Knowledge Management at Water Utilities (4003), released in 2011 in partnership with EPA, breaks down the costs and of benefits of knowledge management and the efforts necessary to develop a deeper, shared knowledge of undocumented information. Two accompanying tools aid drinking water utilities in implementing knowledge management strategies, covering everything from evaluating organizational readiness to sustaining a prolonged effort.

Moreover, WRF is not simply working to safeguard current knowledge, but going a step further to foster an understanding of new technologies and processes. Recent research provides guidance on operator training for emerging water treatment

GENERATIONAL WORKFORCE COMPARISON

	Baby Boomers 1946-1960	Gen X 1961-1980	Millennials 1981-1995	Gen Z Born Since 1995
Best Work Traits	• Optimistic • Enjoy Mentoring • Strong Work Ethic	• Independent • Innovative • Strong Communicators	• Tech Savvy • Collaborative • Focused on Greater Good	• Digitally Fluent • Practical • Flourish with Diversity
What They Want from Work	• Loyal Employer • Hierarchical Culture • Opportunity to Mentor • Respect	• Trustworthy Employer • Competent Colleagues • Autonomy • Problem-Solving Opportunities	• Empathetic Employer • Meaningful Work • Flexibility • New Skills Training	• Culturally Competent Employer • Competitive Wages • Mentorship • Stability
How to Motivate	• Leverage Optimism • Offer Collaboration Opportunities • Use Their Suggestions and Expertise	• Engage Their Critical Thinking Skills • Give Credit for Work • Assign Meaningful Tasks to Complete Individually	• Match Them with Inspiring Leaders • Offer Prompt Feedback • Let Them Present Their Successes	• Provide Best Practices • Allow Them to Discover and Iterate Individually • Share Overt Gratitude for Contributions

Source: WRF Project 4982

strategies, such as the advanced processes necessary for potable reuse. The 2017 project, *Development of an Operation and Maintenance Plan and Training and Certification for Direct Potable Reuse Systems* (Reuse-13-13), illustrates a standard process for direct potable reuse operations and upkeep and takes the first step in identifying the employee skills and training needed to carry out these activities.

Building on this research, *Curriculum and Content for Potable Reuse Operator Training* (Reuse-15-05) features some of the first tools designed to help utility personnel understand specific treatment processes and other unique issues that are fundamental to the safe operation of potable reuse facilities. Utilities can access a series of modules designed to educate operators on technologies and other topics not traditionally found in water treatment systems, based on treatment processes they have in place and other specific needs. This information is being used to form standard training, including an operator certification program for advanced water treatment developed by the California-Nevada section of AWWA and the California Water Environment Association.

Utility of the Future

While preserving knowledge is fundamental to workforce stability, today's utilities must do more than train a new generation of workers to operate treatment plants. With increased automation and new technology, workers must learn an entirely new set of skills to do their jobs. As digital literacy and competency increasingly drive processes, WRF research is providing the tools and resources to cultivate new expertise and ensure utilities are ready for this new normal.

Resources like *Building Workforce Skills for Intelligent Water Operations* (4663) help utilities prepare for anticipated changes as they implement increased automation and smart water technologies. The research takes a comprehensive look at shifting job requirements and how they will look at key milestones through the year 2040. The report also explores various means of attracting and training both new and existing workers to fill these more skilled positions.

Succession Planning

Because the average water worker is older than employees in other industries, the water sector is extremely vulnerable to the large-scale turnover expected as aging Baby Boomers retire. As a result, utilities will not only need to develop concrete plans to protect the knowledge these experienced workers hold, but also to recruit new skilled employees. WRF has been an early leader in addressing what comes next, helping utilities navigate the transition in a changing work environment and manage labor shortages.

As early as 2005, *Succession Planning for a Vital Workforce in the Information Age* (02-CTS-7CO) brought many of these issues to light. The research provided critical insight into water sector demographics, finding that at the time nearly one-fourth of current water employees would be eligible to retire within 10 years and calling out corresponding shortfalls in expertise. While the research identified future knowledge gaps, it also provided some of the first guidance and tools to deal with coming shortages. The tools, which are still relevant today, help utilities develop future workforce plans, take inventory of their utility operations and maintenance skills, cultivate training curricula, and retain tacit knowledge.

More recently, WRF took another look at this issue, partnering with Brookings to release *Renewing the Water Workforce: Improving Water Infrastructure and Creating a Pipeline to Opportunity* (4751). The report captures a snapshot of the 1.7 million U.S. water workers and serves as a guide on the range of available water jobs as well as potential labor pools. It also lays out a set of actionable strategies to use in hiring, training, and retention efforts.

Recruitment and Retention

With a surge of employee turnover in sight, the water sector must look ahead and rethink its approach to human resources. Attracting, training, and retaining a new generation of capable employees is fundamental to the continued stability of the water workforce—and establishing the water sector as an attractive career path is key to this initiative. WRF research provides strong guidance on engaging and maintaining fresh labor pools and managing a future workforce that may have a different set of expectations and demands.

The 2008 handbook, *Workforce Planning for Water Utilities—Successful Recruiting, Training, and Retaining Operators and Engineers to Meet Future Challenges* (4005), offers practical methods utilities can use to address the labor crisis within their organization, which are identified through an easy-to-follow four-step process. An interactive companion program leads users through a series of practice statements to select specific strategies for recruitment, development, and retention.

WRF research also tackles emerging concepts and practices for retaining new employees long term, such as work-life balance and employee life-cycle management, where organizations proactively manage employee relationships from time of hire through relationship end. In 2019, WRF partnered with WSAA and UKWIR on one such effort. *Strategic Workforce Plan and Employee Value Proposition (EVP)* (4982) focuses on striking a balance between the value that is expected to be contributed by an employee with the value expected in return. A series of interactive workshops and presentations provides a basis for improved employer-employee relations, illustrating how to develop EVPs, along with employee personas to support differing EVPs for various employees within the water sector.

Safety

While a vital, skilled body of employees is important, the most critical component of a strong water workforce is safety—the safety of the communities they serve as well as their own personal wellbeing. Activities performed in water utilities frequently involve high-hazard elements, specifically, confined spaces, energized electrical systems, elevated positions, or hazardous chemicals. Special procedures and equipment can often help mitigate these hazards, but control measures can involve additional personnel, time, and equipment. WRF understands the importance of these issues, and provides research and resources to protect these essential workers.

A core research focus has been the concept of prevention through design (PtD), the engineering of processes and environments to reduce workplace risk. In 2010, WRF partnered with EPA to publish *Water Utility Safety and Health: Review of Best Practices* (3104), highlighting practices to integrate worker health and safety into the design of new and retrofit drinking water conveyance, treatment, and distribution systems. The research also assesses the cost effectiveness of incorporating ergonomic designs into facilities and identifies proactive and reactive programs that promote worker health and safety.

Expanding on this concept, *Workforce Health and Safety: Prevention Through Design* (4236), released in 2014, identifies barriers to PtD processes and offers implementation strategies to overcome them. A series of models helps water utilities measure the costs and benefits of PtD, incorporating factors like financial data, labor hours, and risk profiles.

More recent research explores the concept of participatory ergonomics—or involving workers firsthand in the implementation of processes to reduce work-related injuries. The 2019 handbook, *Development of an Ergonomic Guide through the Use of Participatory Ergonomics Team Approach at Water and Wastewater Utilities* (4694), explores this concept in detail. The result of a collaboration with six municipalities from across the country, the manual guides utilities through how to implement a participatory ergonomics framework, providing examples of solutions that have been successfully implemented.

WHAT'S NEXT?

Just as clean, safe water will always be a necessity, the workforce that supports this valuable resource will be just as essential. WRF continues to move forward with research to bolster a strong, competent body of employees, offering resources to ingrain new knowledge as well as to retain core skills.

Ongoing research, such as *Evaluating Utility Staff Training to Improve Knowledge Retention* (5074), is taking steps to advance the internal training processes necessary to support skilled employees. In conjunction with the Los Angeles Department of Water and Power, this research is evaluating different training modes, such as video, online, hands on, and instructor-led, to determine the methods that provide the best educational results, which could ultimately help form the basis of industry standard programs.

Framework for an Intelligent Water System (5039) is also helping ensure necessary information makes it into the hands of the employees who need it. This project will help utilities understand the various terms, practices, and technologies that are essential to becoming a smart utility.

Accenture. 2016. *Accenture: Technology Vision 2016: People First: The Primacy of People in a Digital Age*. https://www.accenture.com/t20160606t104008z__w__/in-en/_acnmedia/pdf-21/accenture-tech-vision-pega.pdf.

Kane, J. and A. Tomer. 2018. *Renewing the Water Workforce: Improving Water Infrastructure and Creating a Pipeline to Opportunity*. Washington, DC: Metropolitan Policy Program at Brookings.